Bart Garssen, David Godden, Gordon R. Mitchell, Jean H.M. Wagemans (Eds.)

Proceedings of the Ninth Conference of the International Society for the Study of Argumentation

Metaphor in argument production vs. understanding

FRANCESCA ERVAS & AMITASH OJHA

Department of Pedagogy, Psychology, Philosophy
University of Cagliari
Italy
ervas@unica.it

Department of Pedagogy, Psychology, Philosophy
University of Cagliari
Italy
amitashojha@unica.it

ABSTRACT: Studies have shown that metaphors influence the understanding of a lexical ambiguity fallacy (Ervas et al. 2015, 2018). However, a systematic research on the effects of metaphors in argument production is still missing. The paper presents the results of an experiment where participants completed lexical ambiguous arguments, selecting either a metaphor or a literal word as the middle term. It shows that metaphor conventionality and plausibility of argument conclusion influence both argument production and understanding differently.

1. INTRODUCTION

Recent literature in argumentation theory has reconsidered the role of metaphor as a powerful device for reasoning, rather than either a linguistic anomaly or embellishment. It has been claimed that metaphor might be seen as an "implicit argument" where some inferences can be drawn from the comparison of the source (S) and the target (T) conceptual domain (Oswald & Rihs, 2014; Macagno & Zavatta, 2014; Fischer, 2015; Wagemans, 2016). Thus, far from being just a source of reasoning errors and argumentative fallacies, metaphor might be considered a creative way to explore new conceptual combinations and to bridge the gap of implicit premises in enthymematic argumentation.

In our previous research, we empirically investigated the role of metaphor in argumentation, focusing on the understanding of fallacies generated by lexical ambiguities (Ervas & Ledda, 2014; Ervas et al., 2015; Ervas, Ledda, & Pierro, 2016; Ervas et al., 2018). More specifically, we adopted the methodological approach of experimental pragmatics to show that a metaphor might elicit a "creative style of reasoning", leading participants to find alternative interpretations of the metaphor, supporting the conclusion of the arguments. This empirical line of research might shed a light on how argumentative rationality moves away from norms in both the understanding and the production of arguments featuring metaphors. However, while previous research has already shown that an argument featuring a metaphor creates a strong bias in argument understanding (Thibodeau & Boroditsky, 2011, 2013; Steen, Reijenierse, & Burgers, 2014), – to the best of our knowledge – no empirical research has been conducted on the production of arguments featuring metaphors. The present work aims to fill this gap in the research on argumentation, focusing on the production of lexical ambiguity fallacies, i.e. quaternio terminorum, having a metaphor as middle term.

The following sections present our predictions on argument production vs. understanding (§ 2), the method we adopted to test the predictions (§ 3) and the results (§ 4) of

a pilot experimental study where participants were asked to complete verbal argument selecting either a metaphor or a literal word as middle term of a lexically ambiguous argument. The last sections discuss the results (§ 5) of the experimental study and draw some conclusions (& 6), comparing participants' performance on the production of lexically ambiguous, "metaphorical" arguments with participants' performance on the understanding of the similar arguments, as per results of previous experiments (Ervas et al., 2015; Ervas, Ledda, & Pierro, 2016; Ervas et al., 2018).

2. METAPHOR AS MIDDLE TERM OF LEXICAL AMBIGUOUS ARGUMENT

Recent literature rediscovered the Aristotelian idea of metaphor as a reasoning device, through which a (generally more abstract and less known) target domain is understood in terms of a (generally more concrete and better known) source domain (Hesse, 1963; Kuhn, 1979; Gentner, 1982, 1989; Fischer, 2015). From this perspective metaphor is argumentative, because it acts as an implicit argument where some inferences can be drawn from the source/target domains comparison. It has been argued that metaphor is not just argumentative but also persuasive, because it also acts as a framing strategy that implicitly forces the interpreter to consider the target from a specific perspective (Black, 1954; Lakoff & Johnson, 1980; Burgers et al., 2016). Indeed, in projecting (mapping) the properties of the source domain onto the target domain, some properties of the source domain are selected as salient to understand the target domain, while other properties remain "unexploited" as irrelevant for the metaphorical interpretation (Carston, 2002; Glucksberg, 2001, 2003; Rubio Fernandez, 2007).

Previous studies aimed to understand whether and to what extent metaphors might be considered as an argument by analogy (Perelman & Olbrechts-Tyteca, 1969; Santibanez, 2010; Oswald & Rihs, 2014; Svacinova, 2014; Macagno & Zavatta, 2014; see Wagemans, 2016 for criticism). We have argued that, when metaphor is an argument by analogy, it might lead to a faulty analogy exactly because of its framing effect. In such cases, it might have the form of a quaternio terminorum, where a shift in the meaning of the metaphor as middle term of the argument leads to the fallacy of equivocation. For instance, in metaphors with the form "A is B", the two terms A and B belong to semantic domains which are similar/comparable in some respect, i.e. in terms of a set of salient properties X. Indeed, A and B do not share all the properties but only the properties of B that can be mapped onto the target A. In the case of a conventional metaphor, the set of properties X depends on the meaning that are stereotypically associated with the metaphor and have already been lexicalised and stored in dictionaries as a conventional figurative meaning (Black, 1954; Gibbs, 1994; Carston, 2002; Giora, 2003; Kovecses, 2010). In case of a novel metaphor, the set of properties X depends on a novel creative use of the meaning of the corresponding literal term, which needs an interpretative (conscious) act and that might lead to different interpretations on the metaphor producer vs. interpreter part.

If B has the salient property C (belonging to the set X), then the conclusion that A also has the property C follows from the premises, otherwise a faulty analogy might occur. For example, given the metaphor "A man is a wolf" and "aggressive" as the salient property C of the source domain, as per analogy, we can safely conclude that "A man is aggressive", as per the metaphorical interpretation of the term "wolf". The argument would then be:

P1 A man is a wolf.
P2 A wolf is aggressive.
C A man is aggressive.

While the first premise puts forth the metaphor, the second premise makes explicit the salient property that was implicit in the first premise. However, in case the property C is not included in the set of relevant properties X associated with the metaphor, we would be drawn to a faulty analogy as a conclusion:

P1 A man is a wolf.
P2 A wolf is four-legged.
C A man is four-legged.

In such a case, there is a meaning shift of the middle term: the middle term "wolf" is indeed used with the metaphoric meaning in P1 and with the literal meaning in P2. Therefore, the analogical argument is fallacious, and containing four terms instead of three terms, it has the structure of a quaternio terminorum (Ervas, Gola, & Rossi, 2018). Quaternio terminorum is indeed a fallacious argument based on the lexical ambiguity of its middle term, having different meanings in the premises (Woods & Walton, 1989; Van Eemeren, 1992; Tindale, 2006; Copi, Cohen, & McMahon, 2014). When the middle term has a different meaning in the premises, then the syllogism contains a fourth, hidden term, causing the fallacy.

Because of their intrinsic lexical ambiguity, metaphors are extremely likely to cause the fallacy of equivocation and thus to deceive in the evaluation of the argument strength, i.e. the proper attribution of a certain analogy as its conclusion. In this sense, they might be particularly persuasive. Previous experiments suggested that participants have some difficulties in detecting a lexical ambiguity fallacy, especially when arguments are based on conventional metaphors (Ervas et al., 2015) and even when participants are experts, i.e. trained in logic and argumentation (Ervas, Ledda, & Pierro, 2016). The metaphoric effect shows its influence when participants are asked to verify the connection between the premises and the conclusion of an argument, particularly when the conclusion of an argument is far from being patently false, as in the following case:

P1 A man is a wolf.
P2 A wolf is starving.
C A man is starving.

Indeed, in previous experimental studies (Ervas et al., 2015, 2018), the results suggested that quaternio terminorum with plausible conclusion, such as "A man is starving", is by far the most difficult to evaluate compared to both strong arguments concluding with "A man is aggressive", where the middle term is used with the same meaning in both the premises and standard quaternio terminorum, where the patently false conclusion "A man is four-legged" facilitates the detection of the fallacy. Indeed, when the analogy leads to a faulty, but plausible or at least believable conclusion, there might arise «a conflict between two types of thought processes, one logical reasoning according to the instructions and the other a response on the basis of their prior beliefs» (Evans, 2004, pp. 139-140). As recognised by a rather wide literature (Baron, 1988; Oakhill et al., 1989; Kunda, 1990; Ball et al., 2006; Correia, 2011), participants believing in the conclusion are unaware of committing to a faulty analogy and adjusting the interpretation of the premises to align them with the believed conclusion. The main finding of our previous research is that this kind of conflict is at work especially in the case of lexically ambiguous fallacy with plausible conclusions, where the participants' belief in the conclusion forced the participant to search for alternative interpretation of the metaphorical middle term to connect the believed conclusion and the premises (Ervas et al., 2018). In this process, conventional metaphors might be revitalised to fit the (prior) beliefs of the participants in the conclusion.

The results on argument understanding also suggested that arguments' evaluation

depends on the kind of lexical disambiguation process required to understand the meanings of the middle term in the premises: in general, literal middle terms made it easier to evaluate an argument than metaphorical middle terms. Especially literal homonymous middle terms are easier to disambiguate even when compared to polysemous middle terms, because homonymous terms, such as "bank", have two completely different meanings ("finance house" and "riverside") while polysemous terms, such as "letter", might have meanings ("symbol of the alphabet" and "written message") overlapping for some properties (Carston, 2002; Kovecses, 2010). Therefore, in case of polysemous middle terms, the disambiguation process involves specific properties to be evaluated and compared with the property made explicit in the second premise. The process of disambiguation of polysemous terms is similar to the interpretation process of conventional metaphors (Gernsbacher & Faust, 1991; Gernsbacher et al., 2001; Glucksberg et al., 2001; Rubio Fernandez, 2007), even though in the latter case the covert framing effect further influences participants' evaluation of the arguments. Diversely from conventional metaphors, novel metaphors are more difficult to understand as, per the definition, they are more unfamiliar and require wider contexts to be more meaningful and easily understandable (Gildea & Glucksberg, 1983; Glucksberg & Estes, 2000; Bambini et al., 2016). However, these are also the reasons why novel metaphor are "less persuasive" when compared to conventional metaphors, which are intuitively considered as true and associated with a system of commonplaces covertly and automatically activated by participants (Black, 1954; Lakoff, 2004; Thibodeau & Borodistky, 2011, 2013). Participants were instead well aware of the presence of a novel metaphor in the first premise and considered it as false (Ervas & Ledda, 2014), even though interpretable as true with conscious effort and additional explanations.

However, a systematic research on the features that affect metaphor quality (and therefore its persuasive value) in argument production is still missing. As recently pointed out (Steen, 2008, 2010, 2013, 2015), metaphor use might be deliberate, especially when an argument is produced for specific communicative purposes. There is indeed an asymmetry between argument production and understanding: while the argument receiver cannot be sure of (the degree of) metaphor deliberateness, the argument producer might be well aware of this practice. In Gerard Steen's words (2011, pp. 84-85):

There still remain many questions about deliberate metaphor, for instance the possible asymmetry between production and reception: a metaphor may be deliberately produced as a metaphor but not received as one, or, the other way around, a metaphor may have been produced non-deliberately as a metaphor but still be received as a cross-domain comparison by the interlocutor or audience. Careful theoretical and empirical work will have to elaborate how the notion of deliberate metaphor can be conceived of in these contexts.

When a speaker *deliberately* produces a metaphor might want to change the addressee's perspective on the target «by making the addressee look at it from a different conceptual domain or space, which functions as a conceptual source» (Steen, 2008, p. 222). Of course, novel metaphors can better serve this function, because they force the audience to look at the target from a source domain which is neither already associated in that way nor included in a stereotyped system of beliefs. However, a speaker might also deliberately choose to avoid lexical ambiguities and be clearer, especially in case of novel metaphor, whose interpretation is quite demanding and prone to misunderstanding. A conventional metaphor might instead be a good candidate to produce persuasive arguments, because of its covert framing effect. Moreover, the use of deliberate metaphor might revitalise conventional metaphors which are usually produced as non-deliberate metaphors in communication (Steen, 2010).

For our study, we predicted that precisely conventional metaphors can be implicitly used in argument production to build an argument that is apparently sound (i.e. with a plausible conclusion that might seem to follow from true premises), even though fallacious, because of

their covert framing effect. Novel metaphors might instead need an explicit clarification of their metaphorical meaning to reach the effect desired by the argument producer. Indeed, being less familiar and requiring a wider context to be fully understood, they represent a risk of misunderstanding that an argument producer might like to avoid.

3. EXPERIMENT

In order to test our predictions, we conducted a pilot experimental study asking N=13 participants (M = 5; F = 8) to produce verbal arguments having the syllogistic structure, by choosing – among different options – the middle term that best fits the arguments. A set of N=6 arguments were strong arguments (SA) where the middle term was used with the same meaning in both the premises; a set of N=6 arguments were fallacious arguments with a patently false conclusion and the middle term was used with different meanings in the premises (standard quaternio terminorum, SQT); a set of N=6 arguments were fallacious arguments with a plausible conclusion and the middle term used with different meanings in the premises (quaternio terminorum with plausible conclusion, QTPC). Moreover, the arguments might have literal or metaphorical middle terms: in case of literal middle terms, participants could select either homonymous (H) or polysemous (P) middle terms; in case of metaphorical middle terms, participants could select either conventional metaphors (CM) or novel metaphors (NM) as middle terms. Therefore the experiment had a 3 x 4 experimental design, with 3 argument structure conditions (SA, SQT, QTPC) and 4 middle term conditions (H, P, CM, NM).

3.1 Material

The material of the pilot study was the already validated set of arguments in Italian used by Ervas and colleagues (2018, Supplementary table 10) to test the understanding of quaternio terminorum with literal vs. metaphorical middle terms. All the metaphors appeared in the first premise of the arguments. A total of 72 arguments were presented without middle terms and participants were asked to complete the arguments choosing the middle term among the different options summarised in Table 1.

Literal middle terms (H/P)	Metaphorical middle terms (CM/NM)
Lexically ambiguous term	Lexically ambiguous term
Literal meaning 1	Metaphorical meaning
Literal meaning 2	Literal meaning (of the metaphor)
Conventional metaphor	Literal unambiguous meaning
Random meaning (control)	Random meaning (control)

Table 1. Types of middle term to be selected in the argument production task.

In the case of literal (H or P) middle terms, participants could choose among the following five options: the ambiguous term (ex. "bank"), its two literal meanings (ex. literal meaning 1, "finance house" and literal meaning 2, "riverside"), a conventional metaphor (in Italian) that plausibly fits the first premise of the argument (ex. "a mine") and a randomly chosen term, without connection with the argument (ex. "apple"). In the case of metaphorical (CM or NM) middle terms, they could choose among the ambiguous term (ex. "star"), the metaphorical meaning (ex. "famous person"), the literal meaning of the term, i.e. the vehicle of the metaphor (ex. "planet"), a literal unambiguous appropriate meaning (ex. "an actor"), and a randomly chosen term, without connection with the argument (ex. "fork"). An example for both literal and metaphorical middle term conditions is given in Table 2.

Example of strong argument without H middle term	Example of standard quaternio terminorum without DM middle term
P1 Banco di Sardegna is ___ **P2** ___ is a financial institution. **C** Banco di Sardegna is a financial institution.	**P1** Clooney is ___ **P2** ___ is a celestial body. **C** Clooney is a celestial body.
Options:	**Options:**
A BANK	A STAR
A FINANCE HOUSE	A FAMOUS PERSON
A RIVER SIDE	A PLANET
A MINE	AN ACTOR
AN APPLE	A FORK

Table 2. Examples of arguments to be completed and middle term options.

3.2 Rating studies

We tested middle terms, premises and conclusions of the arguments in a series of rating studies. A first set of terms was selected according to the number of letters and frequency in the GRADIT (De Mauro, 2000), to form H, P, DM, LM middle terms in the premises of the arguments. The emotional (positive and negative) meaning and familiarity of the selected terms were tested in the first rating study, in order to select just the terms with "neutral" emotional meaning and sufficient familiarity. We used the unambiguous terms as novel metaphors and then we devised the arguments in three categories: strong arguments, standard quaternio terminorum and quaternio terminorum with plausible conclusion. In the second rating study, we tested the premises and the conclusions of the arguments separately, to make sure that participants attribute either the same meaning to the middle terms in case of strong arguments, or different meanings in case of fallacious arguments. In the third rating study, we asked participants to assess whether they perceived the premises and the conclusions as true, false or

plausible. The results of the rating studies showed that the majority of sentences with a conventional metaphor (83%) were perceived as true while the majority of sentences with a novel metaphor (79%) were perceived as false (Ervas & Ledda, 2014).

3.3 Procedure

All the participants were asked for a written informed consent and the test was submitted to participants online via Google Forms. After gathering initial information on language and education, participants were asked to read the instructions and complete two practice blocks. The arguments, as well as the options for each argument, were randomly presented to participants. We asked participants to choose the option that in their opinion best fits the argument presented to them, thus testing their argument production in all the structure conditions: strong argument vs. fallacious argument (in both the forms of standard quaternio terminorum and quaternio terminorum with plausible conclusion) structure conditions.

4. RESULTS

To determine the statistical significance of the results, a one way repeated measure ANOVA was performed, comparing strong arguments, standard quaternio terminorum and quaternio terminorum with plausible conclusion within the same middle term (H, P, CM, NM) condition. The results, for each middle term condition, are reported in Table 3.

In the case of H middle terms, participants selected the ambiguous term mostly to build quaternio terminorum than strong arguments, where they alternatively chose also the unambiguous term having the meaning that fits the first premise ($p < .05$). Interestingly, they selected the metaphor significantly more often in the case of quaternio terminorum with plausible conclusion ($p < .01$) rather than standard quaternio terminorum. In the case of P middle terms, participants selected the ambiguous term to build both strong arguments and quaternio terminorum ($p < .05$). Interestingly they selected the literal meaning that fits the second premise especially in the case of quaternio terminorum with plausible conclusion ($p < .001$), when compared to both strong arguments and standard quaternio terminorum.

In the case of CM middle terms, participants selected the ambiguous metaphorical term mostly to build quaternio terminorum than strong arguments, where they significantly chose the explanation of the metaphorical meaning or the literal unambiguous meaning. Interestingly, in the case of quaternio terminorum, they selected the explanation of the metaphorical meaning mostly for fallacious arguments with plausible conclusion ($p < .05$) rather than standard quaternio terminorum ($p < .05$). In the case of NM middle terms, there was no statistical significance in the selection of ambiguous metaphorical terms, when comparing strong arguments and quaternio terminorum. In each argument structure conditions, participants preferred to select the explanation of the metaphorical meaning ($p < .05$) or the literal unambiguous meaning ($p < .01$).

H middle terms

	Strong Arguments	Standard quaternio terminorum	Quaternio terminorum with plausible conclusion
Ambiguous term	47.5**	80.6**	81.1
Literal meaning 1	39.5*	10.4*	1.1*
Literal meaning 2	11.5	6.3	10.5
Metaphor	1.5**	0	7.3**
Random	0	2.7	0

P middle terms

	Strong Arguments	Standard quaternio terminorum	Quaternio terminorum with plausible conclusion
Ambiguous term	78.5*	87.5*	69.6
Literal meaning 1	17	8.5	5.4
Literal meaning 2	2***	1***	21***
Metaphor	1.5	3	4
Random	1	0	0

CM middle terms

	Strong Arguments	Standard quaternio terminorum	Quaternio terminorum with plausible conclusion
Ambiguous term	52.5	74.6**	60.7**
Metaphorical meaning	17*	5*	20.3*
Literal meaning	12.5**	9**	9**
Literal unambiguous	18	11.4	10
Random	0	0	0

NM middle terms

	Strong Arguments	Standard quaternio terminorum	Quaternio terminorum with plausible conclusion
Ambiguous term	18	20.5	19
Metaphorical meaning	39.8*	26*	32*
Literal meaning	1.2	9.5	16.5
Literal unambiguous	38.5**	41**	31**
Random	2.5	3	1.5

*= p < .05, **= p < .01, *** = p < .001

Table 3. Results in percentage for each middle term condition and argument structure condition.

5. DISCUSSION OF RESULTS

Overall the results show that participants avoid metaphorical terms when building strong arguments, when compared to other argument structure conditions, especially when metaphors are novel. As metaphors are a possible source of fallacies or they activate possible framing effects (Black, 1954; Lakoff, 2004; Thibodeau & Borodistky, 2011, 2013), participants probably avoided them in order to be sure to produce clear argument without source for misunderstanding. Moreover, they preferred to clarify the meaning of the metaphor, i.e. the way it is used in the first premise, or to use a literal (unambiguous) meaning. Interestingly, in the case of conventional metaphor, they significantly selected the corresponding literal meaning which still might work when the relevant property is selected in the second premise to produce a strong argument.

The results also show that participants selected the ambiguous term to produce fallacious arguments, especially in the case of standard quaternio terminorum. Unsurprisingly, lexical ambiguity is a good option to produce fallacious arguments that exploits the meaning shift of the middle term through the premises (Woods & Walton, 1989; Van Eemeren, 1992; Tindale, 2006; Copi, Cohen, & McMahon, 2014). However, NM middle terms seem to be an

exception: indeed, in the case of novel metaphors, participants never selected the ambiguous term (i.e. the novel metaphor itself), preferring the explanation of the metaphor, i.e. the metaphorical meaning, or even the literal appropriate meaning. The participants' choice might be due to the fact that novel metaphors, per definition, are more difficult to interpret, requiring a wider context to be fully understood (Gildea & Glucksberg, 1983; Glucksberg & Estes, 2000; Bambini et al., 2016). The selection of a novel metaphor is avoided even in the case of fallacious argument production, where arguments might easily be detected as fallacious when a novel metaphor appears in the first premise. Indeed, as testified by the rating studies, a majority of premises with novel metaphors are recognised as false by the participants, and possibly leading to an "ex falso quodlibet". A greater effort in interpretation is required to explain the meaning of a premise featuring a novel metaphor as it were meaningful and true (or at least plausible) (Gildea & Glucksberg, 1983; Glucksberg, 2003; Vega Moreno, 2007).

Also in the case of homonymous middle terms, participants significantly avoided ambiguous terms in the strong argument condition rather than in fallacious argument conditions, even though the ambiguous literal term could have been used with the same meaning in both the premises. Indeed, they significantly chose the proper literal meaning employed in the first premise they read to avoid ambiguity and thus possible misunderstanding. The case of polysemous middle terms seems somewhat different: participants significantly selected the polysemous middle term to build both clearly strong and clearly fallacious arguments. Differently from homonymous terms, where the disambiguation happens by default, by suppressing one of the two completely different literal meanings (Gernsbacher & Faust, 1991; Gernsbacher et al., 2001), in case of polysemy participants do not have a list of radically different lexicalised meanings to suppress, but instead different meanings overlapping in some semantic properties (Glucksberg et al., 2001; Rubio Fernandez, 2007).

As the two possible literal meanings of the polysemous middle term overlap, a strong argument precisely contains in the second premise the property that makes the argument a strong one (i.e. the property that clearly fits the meaning of the first premise), while a quaternio terminorum precisely contains the property that makes the argument a fallacious one (i.e. the property that clearly does not fit the meaning of the first premise). In both the cases, the property is given in the second premise of an argument with either a clearly true or a clearly false conclusion and therefore participants do not need to go through the process of disambiguation, which is more demanding when compared to the process required to disambiguate homonymous terms (Gernsbacher & Faust, 1991; Gernsbacher et al., 2001; Glucksberg et al., 2001). Indeed, in the process of homonymy disambiguation the irrelevant meaning disappears significantly more quickly, when compared to the process of polysemy interpretation, which requires more attentional resources to suppress the corresponding literal meaning (Rubio Fernandez, 2007), as a (set of) specific property(ies) need(s) to be detected. Instead, in the case of quaternio terminorum with plausible conclusion, the participants explicitly selected the literal meaning of the polysemous term that fits the second premise, plausibly because the property made explicit in the second premise does not align with neither a clearly true nor a clearly false conclusion. Therefore, instead of keeping the ambiguous term, participants are forced to select the literal meaning yielding the property that best aligns with the plausible conclusion.

In the case of quaternio terminorum with plausible conclusion with a conventional metaphor as middle term, participants selected either the ambiguous metaphorical term or the explanation of the metaphorical term. This suggest that, in order to maintain a plausible conclusion, participants deliberately chose to provide the middle term with either an implicit or even an explicit metaphorical reading. Instead, to maintain a clearly false conclusion, participants did not need to make explicit the metaphorical reading of the middle term: a conventional metaphor and an irrelevant (literal) property of the second premise are sufficient

to guarantee the production of the standard quaternio terminorum. In the case of novel metaphors, participants felt the necessity to make explicit the metaphorical meaning of the middle term not only for fallacious arguments with plausible conclusion but also for standard quaternio terminorum and strong arguments. Therefore for any argument structure condition with novel metaphors as middle terms, participants needed to clarify the metaphorical reading of the middle term to build an argument: the difficulty in novel metaphor interpretation and the possibility to be misinterpreted led them to make the metaphorical explicit in any case, independent from the argument structure condition and the type of conclusion.

6. CONCLUSION

In previous experiments on the understanding of arguments featuring metaphors as middle terms, results suggest that fallacious argument with conventional metaphors are more difficult to detect, as they covertly activate framing effects that lead participants to consider the premises as true and to adjust the metaphorical meaning according to the plausible conclusion. The revitalization of the conventional metaphors in the premises are guided by the need to confirm participants' belief in the conclusion (Ervas et al., 2018). Indeed, while novel metaphors consciously lead participants toward creative interpretations (Vega Moreno, 2007) from the reading of the first premise featuring the metaphor, conventional metaphors covertly influence their reading of the argument, especially when the conclusion is believable.

The results of the present experimental study on argument production suggest that participants generally avoid lexical ambiguities when producing strong arguments and vice versa exploit lexical ambiguities when producing fallacious arguments. However, the results show that novel metaphors are avoided in any case, even to produce standard quaternio terminorum. In order to produce an argument with a novel metaphorical meaning without being misinterpreted, participants prefer to make the metaphorical meaning explicit. On the contrary, participants made a deliberate use of conventional metaphors to produce fallacious argument and, in the case of plausible conclusion, they alternatively make the metaphorical meaning explicit, thus suggesting an overall metaphorical reading of the argument produced. The overall results suggest that it is easier to produce (believable) fallacies with conventional metaphors rather than with novel metaphors, where the implicitness of the metaphorical meaning is abandoned in favour of clarity and understandability of the argument.

REFERENCES

Ball, L. J., Phillips, P., Wade, C. N., Quayle, J. D. (2006). Effects of belief and logic on syllogistic reasoning: Eye-movement evidence for selective processing models. *Experimental Psychology*, *53*(1), 77-86.

Bambini, V., Bertini, C., Schaeken, W., Stella, A., & Di Russo, F. (2016). Disentangling Metaphor from Context: An ERP study. *Frontiers in Psychology*, 7:559.

Baron, J. (1988). *Thinking and Deciding*. Cambridge: Cambridge University Press.

Black, M. (1954). Metaphor. *Proceedings of the Aristotelian Society*, *55*, 273-294.

Burgers, C., Konijn, E. A., & Steen, G. (2016). Figurative Framing: Shaping Public Discourse Through Metaphor, Hyperbole, and Irony. *Communication theory*, 1-21.

Carston, R. (2002). *Thoughts and Utterances: The Pragmatics of Explicit Communication*. Oxford: Blackwell.

Copi, I. M., Cohen, C., & McMahon, K. (2014). *Introduction to Logic*. Harlow, UK: Pearson.

Correia, V. (2011). Biases and fallacies: The role of motivated irrationality in fallacious reasoning. *Cogency*, *3*, 107-126.

De Mauro, T. (2000). *GRADIT: Grande dizionario italiano dell'uso*. Torino: UTET.

Ervas, F., & Ledda, A. (2014). Metaphors in quaternio terminorum comprehension. *Isonomia*, 4, 179-202.

Ervas, F., Gola, E., Ledda, A., & Sergioli, G. (2015). Lexical ambiguity in elementary inferences: An experimental study. *Discipline Filosofiche*, *22*, 149-172.

Ervas, F., Ledda, A., & Pierro, A. (2016). Does Expertise Favour the Detection of the Metaphoric Fallacy? In L. Bonelli, S. Felletti, & F. Paglieri (Eds.), *The Psychology of Argument* (pp. 223-224). Studies in Logic and Argumentation Series 59, London: London College Publication.

Ervas, F., Gola, E., Rossi, M. G. (2018). Argumentation as a bridge between metaphor and reasoning. In S. Oswald, T. Herman, & J. Jacquin (Eds.), *Argumentation and Language. Linguistic, Cognitive and Discursive Explorations* (pp. 153-170). Berlin: Springer.

Ervas, F., Ledda, A., Ojha, A., Pierro, G. A., & Indurkhya, B. (2018). Creative Argumentation: When and Why People Commit the Metaphoric Fallacy. *Frontiers in Psychology*, 9:1815.

Evans, J. (2004). Biases in deductive reasoning. In R. Pohl (Ed.), *Cognitive Illusions. A Handbook on Fallacies and Biases in Thinking, Judgement and Memory* (pp. 127-144). Hove and New York: Psychology Press.

Fischer, E. (2015). Mind the metaphor! A systematic fallacy in analogical reasoning. *Analysis*, *75*, 67-77.

Gentner, D. (1982). Are scientific analogies metaphors? In D. S. Miall (Ed.), *Metaphor: Problems and perspectives* (pp. 106-132). Brighton, UK: Harvester Press.

Gentner, D. (1989). The mechanisms of analogical learning. In S. Vosniadou, & A. Ortony (Eds.), *Similarity and analogical reasoning* (pp. 199-241). Cambridge, UK: Cambridge University Press.

Gernsbacher, M. A., & Faust, M. (1991). The role of suppression in sentence comprehension. In G.B. Simpson (Ed.), *Understanding Word and Sentence* (pp. 97-128). Amsterdam: Elsevier.

Gernsbacher, M. A., Keysar, B., Robertson, R. R. W., & Werner, N. K. (2001). The role of suppression and enhancement in understanding metaphors. *Journal of Memory and Language*, *45*, 433-450.

Gibbs, R. W. (1994). *The Poetics of Mind: Figurative Thought, Language and Understanding*. Cambridge: Cambridge University Press.

Gildea, P., & Glucksberg, S. (1983). On understanding metaphor: The role of context. *Journal of Verbal Learning and Verbal Behavior*, *22*, 577-590.

Giora, R. (2003). *On Our Mind: Salience, Context And Figurative Lang*uage. Oxford: Oxford University Press.

Glucksberg, S. (2001). *Understanding Figurative Language: From Metaphors to Idioms*. Oxford, Oxford University Press.

Glucksberg, S. (2003). The Psycholinguistics of Metaphor. *Trends in Cognitive Sciences*, *7*, 92-96.

Glucksberg, S., & Estes, A. (2000). Feature accessibility in conceptual combination: Effects of context-induced relevance. *Psychonomic Bulletin Review*, *7*, 510-515.

Glucksberg, S., Newsome, M. R., & Goldvarg, Y. (2001). Inhibition of the literal: Filtering metaphor-irrelevant information during metaphor comprehension. *Metaphor and Symbol*, *16*, 277-298.

Hesse, M. (1963). *Models and analogies in Science*. London: Sheed & Ward.

Kövecses, Z. (2010). *Metaphor: a Practical introduction*. Oxford: Oxford University Press.

Kuhn, T. (1979). Metaphor in Science. In A. Ortony (Ed.), *Metaphor and Thought* (pp. 409-419). Cambridge: Cambridge University Press.

Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin*, *108*, 480-498.

Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago: University of Chicago Press.

Lakoff, G. (2004). *Don't Think of an Elephant! Know Your Values and Frame the Debate*. White River Junction: Chelsea Green Publishing.

Macagno, F., & Zavatta, B. (2014). Reconstructing metaphorical meaning. *Argumentation*, *28*, 453-488.

Oakhill, J., Johnson-Laird, P. N., & Garnham, A. (1989). Believability and syllogistic reasoning. *Cognition*, *31*, 117-140.

Oswald, S., & Rihs, A. (2014). Metaphor as argument: Rhetorical and epistemic advantages of extended metaphors. *Argumentation*, *28*, 133-159.

Perelman, C., & Olbrechts-Tyteca, L. (1969). *The new rhetoric: A treatise on Argumentation*. Notre Dame, Ind: University of Notre Dame Press.

Rubio Fernandez, P. (2007). Suppression in metaphor interpretation: Differences between meaning selection and meaning construction. *Journal of Semantics*, *24*, 345-371.

Santibáñez, C. (2010). Metaphors and argumentation: The case of Chilean parliamentarian media participation. *Journal of Pragmatics*, *42*, 973-989.

Steen, G. J. (2008). The paradox of metaphor: Why we need a three-dimensional model for metaphor. *Metaphor and Symbol*, *23*(4), 213-241.

Steen, G. J. (2010). *When is metaphor deliberate?*, in N. L. Johannesson, C. Alm-Arvius, & D. C. Minugh (Eds.), *Selected papers from the 2006 and 2007 Stock- holm Metaphor Festivals* (pp. 109-127). Stockholm: University of Stockholm.

Steen, G. J. (2011). From three dimensions to five steps: The value of deliberate metaphor. *metaphorik.de*, *21*, 83-110.

Steen, G. J. (2013). Deliberate metaphor affords conscious metaphorical cognition. *Journal of Cognitive Semiotics*, *5*(1-2), 179-197.

Steen, G. J. (2015). Developing, testing and interpreting Deliberate Metaphor Theory. *Journal of Pragmatics*, *90*, 67-72.

Steen, G. J., Reijnierse, W. G., & Burgers, C. (2014). When do natural language metaphors influence reasoning? A follow-up study to Thibodeau and Boroditsky (2013). *PLoS ONE*, 9: e113536.

Svačinova, I. (2014). Reconstruction of metaphors in argumentation: A case study of Lincoln's metaphor of "swapping horses while crossing a stream". *Cogency*, *6*, 67-89.

Thibodeau, P. H., & Boroditsky, L. (2011). Metaphors we think with: The role of metaphor in reasoning. *PLoS ONE*, 6:e16782.

Thibodeau, P. H., and Boroditsky, L. (2013). Natural language metaphors covertly influence reasoning. *PLoS ONE*, 8:e52961.

Tindale, C.W. (2006). *Fallacies and Argument Appraisal*. Cambridge: Cambridge University Press.

Van Eemeren, F. H., (1992). *Argumentation, Communication and Fallacies*. Hillsdale: Erlbaum.

Vega Moreno, R.E. (2007). *Creativity and Convention: The Pragmatics of Everyday Figurative Speech*. Amsterdam: John Benjamins.

Wagemans, J. H. M. (2016). Analyzing metaphor in argumentative discourse. *Rivista italiana di Filosofia del linguaggio*, *102*, 79-94.

Woods, J., & Walton, D. N. (1989). *Fallacies: Selected Papers, 1972-1982*. Dordrecht: Foris.