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Article abstract

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An Experimental Study on the Evaluation of Metaphorical *Ad Hominem* Arguments

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Abstract: Metaphors are emotionally engaging, influencing the evaluation of arguments. The paper empirically investigates whether metaphors in the premise can lead the evaluator to judge an *ad hominem* argument as sound when the arguer instead committed a fallacy. The results show that *ad hominem* arguments with conventional and positive metaphors are more persuasive compared to those with novel and negative metaphors. Arguments with conventional metaphors are also perceived as more ambiguous, but less convincing, and emotionally appealing. Additionally, participants believe in the conclusion more when the premise contains a positive rather than a negative metaphor, which instead helps the evaluator detect the fallacy.

Résumé: Les métaphores sont émotionnellement engageantes et ainsi influencent l'évaluation des arguments. L'article étudie empiriquement si les métaphores employées dans la prémisse peuvent amener l'évaluateur à juger un argument *ad hominem* comme solide bien que ce sophisme soit commis. Les résultats montrent que les arguments *ad hominem* utilisant des métaphores conventionnelles et positives sont plus convaincants que ceux utilisant des métaphores nouvelles et négatives. Les arguments utilisant des métaphores conventionnelles sont également perçus comme plus ambigus, mais moins convaincants et émotionnellement attrayants. De plus, les participants croient davantage à la conclusion lorsque la prémisse contient une métaphore positive plutôt que négative, ce qui aide plutôt l'évaluateur à détecter le sophisme.

1. Introduction

The use of metaphors in arguments is often seen as potentially deceptive or unclear, leading to logical fallacies (Fisher 2015). Traditionally, figurative language has been seen as risky in argumentation because it can lead to fallacies in reasoning (Hamblin 1970). Metaphors have been viewed as improper and unnecessary in argumentation, deviating from proper language usage (Hoffman 1980; Tourangeau and Sternberg 1982). However, this view has been challenged by philosophers like Max Black (1954) and cognitive linguists like Lakoff and Johnson

(1980), who argue that metaphor allows us to understand abstract concepts by relating them to concrete concepts. Metaphors provide a framework for thinking and reasoning about a concept by selecting certain properties from the concrete concept and ignoring others (Ervas 2019). Indeed, metaphors have a framing effect (Thibodeau and Borodisky 2011, 2013; Burgers 2016; Semino 2018), shaping how we understand the world, and influencing our evaluation of arguments (Ervas, Gola and Rossi 2018).

Researchers have found that metaphors can be useful in making arguments, either to introduce a new perspective or to strengthen an existing one (Wagemans 2016, 2019; van Poppel 2018, 2020). In the context of science, metaphors have been employed to foster creativity (Hofstadter 1995; Indurkha 2010). Recent studies have reevaluated traditional approaches to metaphor as a reasoning tool (Black 1962; Hesse, 1963, 1965; Perelman and Olbrechts-Tyteca 1969), proposing that metaphors themselves could be viewed as “implicit arguments” that lead the audience through a series of inferences from the source to the target to draw a conclusion (Santibáñez 2010; Macagno and Zavatta 2014; Oswald and Rihs 2014). However, metaphors also have an emotional impact, as they might be positively or negatively valenced, as in “That grandmother is a support” and “That friend is a harpy” respectively (Ervas et al. 2021). Emotions are also often seen as contrary to rational thinking, and entailing a framing effect on the object or the person causing the emotions. Thus, they can act as cognitive processes that impact our evaluation of “emotional arguments” in significant and diverse ways, as they make use of an *appeal to emotions* to draw some conclusion.

Among the emotional arguments, we focus on the *ad hominem* argument where emotionally connotated metaphors appear in the premise. The *ad hominem* arguments are indeed part of a debate, where the emotional involvement of individuals is a prominent feature (but see also van Eemeren, Garssen, and Meuffels 2012 for criticisms). We aim to empirically investigate whether emotive metaphors in the *ad hominem* argument premise can lead to evaluating a fallacious *ad hominem* argument as sound. While specifically focused on metaphorical *ad hominem* arguments, the paper is more generally framed in an emerging field in the Experimental Philosophy of Language, known as Experimental Ar-

gument Analysis (see e.g. Fisher and Herbelot 2022). In this perspective, methods coming from psycholinguistics are used to understand the philosophical implications of empirical research on language processing in argumentation. Assessing the participants' intuitive judgments on the properties of the *ad hominem* arguments and their soundness/fallaciousness, the paper examines how metaphor comprehension affects reasoning and evaluation of (*ad hominem*) arguments.

By analyzing participants' evaluation, we aim to understand the psychological mechanisms that bring people to evaluate the conclusions as following from the premises, even when the *ad hominem* arguments presented are fallacious, as well as the possible reasons influencing their evaluation. In particular, this study aims to understand the double (metaphorical and affective) framing of language influences the evaluation of *ad hominem* arguments. We first define the *ad hominem* argument and the metaphorical ad hominem argument, including the double framing effect it entails. We then present the experimental study (the main research questions and hypotheses, the method followed, and the results) and discuss the main findings. We finally draw some conclusions and present future research directions.

2. The *ad hominem* argument

In *The Place of Emotion in Argument* (Walton 1992), different appeals to emotion, such as pity, fear, popular sentiment, and *ad hominem* attacks, are presented and discussed, showing that they are prevalent in argumentation and that they cannot be simply dismissed as fallacious. Walton advocates for a nuanced approach to evaluating their use, by asking whether the appeal to emotion might be evaluated as reasonable, as weak and thus subjected to further critical scrutiny, or as genuinely fallacious. Walton concludes that while appeals to emotion rely on presumptive reasoning that is tentative and subject to default, they are not invariably fallacious forms of argumentation, as often are in argumentation textbooks. Rather, the subtlety and complexity of emotional appeals in argumentation underscores the importance of discerning their soundness on a case-by-case basis. Contextual uses of language, such as metaphors, can be counted as influential in assessing the soundness of emotional arguments on a case-by-case basis, *ad hominem* arguments included.

As Tindale (2007, p. 12) defines it, the *ad hominem* argument “involves an attack against the person delivering the argument rather than the position argued”. However, a proper historical reconstruction of the reflection on the *ad hominem* argument should be traced back to Aristotle, who first defined it in the *Sophistical Refutations* (177b33), as an argument “directed against the questioner, not against the argument”. Later, also John Locke (1690) noted that the *ad hominem* argument “involves some kind of shift from the person’s argument to the person [...] showing the person to be inconsistent in some way” (Tindale 2007, p. 182). An example is the following: “Bacon’s philosophy is untrustworthy because he was removed from his chancellorship for dishonesty” (Copi 1972, p. 75).

In the contemporary theory of argumentation, different types of *ad hominem* arguments have been introduced and sometimes conflated. Firstly, it should be noted that the term *ad hominem* is sometimes mistakenly used to refer to arguments that fall under the category of *ad personam* (Blair and Johnson 2006; Walton 2012, 2013; Groarke and Tindale 2013). The distinction between these types of arguments is quite old, dating back to Aristotle, Locke, and Schopenhauer (Walton 2004). In a nutshell, *ad hominem* (also known as *ex concessis*) arguments refer to something someone says or does to prove a point, while *ad personam* arguments refer to a particular characteristic of the speaker to criticize what they are pointing out. “*Ad personam* argument” is often called “abusive *ad hominem*,” but while the former is not necessarily fallacious, the latter is fallacious (e.g., Walton, Reed, and Macagno 2008). Indeed, the abusive *ad hominem* argument is a direct attack on the character of the speaker presenting the argument, thus undermining the possibility of constructive dialogue following such an attack (Prus 2023).

Ad hominem or *argumentum ex concessis* is a type of argument where the person making the argument uses something that the opponent has said, done, or agreed upon to support their point (in a positive way) or to show that the opponent is contradicting themselves, as Locke noted (1690). This type of argument is different from attacking the opponent’s character, because it only focuses on what the opponent has said in a specific context. *Ad personam* arguments are instead not necessarily fallacious: for example, if someone has a close relationship with the accused, their testimony in court may not be taken as seriously

(Thomas 1973). This can be a legitimate use of *ad hominem* arguments, also known as ethotic arguments. On the contrary, as Schopenhauer noted in *Eristic* (1864), the personal attack is a logical fallacy, and it encompasses various subtypes, such as *tu quoque* and the abusive *ad hominem* argument. The empirical study presented in the paper focused on the *tu quoque*, because it is considered fallacious independently of the dialogue possibly following the attack, and thus the *ad hominem* arguments presented to participants can be evaluated as fallacious even though presented out of the dialogical context. This also allows us to assess the accuracy of the *ad hominem* arguments' evaluators in the empirical study, as well as the properties of the arguments influencing the accuracy of their evaluation.

Van Eemeren and colleagues (Van Eemeren et al., eds., 2014, p. 165) distinguish at least three variants of the *ad hominem* argument: "The fallacy of attacking the other party's person, either directly by depicting them as stupid, bad, or unreliable (abusive variant) or indirectly by casting suspicion on their motives (bias or circumstantial variant) or pointing out a contradiction in their words or deeds (*tu quoque* – you too! – variant)". To the best of our knowledge, Van Eemeren and colleagues (2014, p. 578) have conducted the only empirical study on the *ad hominem* argument. In the study, the participants were asked, on a seven-point Likert scale, ranging from "very unreasonable" (1) to "very reasonable" (7), to evaluate the (un)reasonableness of *ad hominem* arguments in the three variants mentioned above. Results of the study showed that participants found more reasonable *ad hominem* fallacious arguments in the *tu quoque* variant ($M=4.45$, $SD=0.59$) when compared to both the abusive ($M=2.91$, $SD=0.64$) and the circumstantial variants ($M=3.89$, $SD=0.57$).

In Van Eemeren's perspective (2013, p. 142), the reasonableness of arguments (*ad hominem* argument included), concerns the use of reason "in a way that is appropriate in view of the communicative and interactional situation". Thus, reasonableness is contextual-specific, but requires macro-context evaluation which goes far beyond the aims of this empirical study, which does not include the *ad hominem* argument in dialogue and thus does not present dialogical moves or strategic maneuvering. The empirical study presented in the paper focused anyway on the *tu quoque*, as it seems to be the most persuasive variant in the evaluation of *ad hominem* arguments, as per Van Eemeren and colleagues'

results (Van Eemeren et al., eds., 2014). However, the *tu quoque* variant of the *ad hominem* argument is considered fallacious because it represents an attack on a person without connection to the argument's conclusion.

3. The metaphorical *ad hominem* argument

We define the metaphorical *ad hominem* argument as an *ad hominem* argument where a metaphor occurs in a premise to characterize the target of the argument, i.e. the *hominem*. An example of a metaphorical *ad hominem* argument is the following:

(P1) That friend herself says that friendships last a lifetime.

(P2) That friend is a *harpy*.

(C) Friendships do not last a lifetime.

In the example, the (negative conventional) metaphor *harpy* is used to describe the woman as cruel and unpleasant. Metaphor is indeed a linguistic and cognitive process through which a target conceptual domain, that friend, is seen in the light of a source conceptual domain, the harpy (Lakoff and Johnson 1980; Gibbs 1994; Bowdle and Gentner 2005; Carston 2002, 2010). In the process, some properties of the source domain, i.e. being cruel and unpleasant are selected to understand the target domain.

Metaphors might affect the evaluation of arguments because of their covert framing effects on the person described in the *ad hominem* argument. To frame means “to construct something in terms of something else results in a particular view of the ‘something’ in question, often including specific attitudes and evaluations” (Semino 2008, p. 32). In the case of the metaphorical *ad hominem* argument, to frame means to emphasize certain properties or aspects of the perceived reality in communication (Entman 1993), to promote a particular perspective on the person being discussed. This includes defining the person, interpreting and evaluating her, and possibly recommending a course of action against her. As already found in previous experimental studies (Ervas et al. 2015, Ervas et al. 2021), arguments featuring conventional metaphors, i.e., already lexicalized and unnoticed because widely used in a

linguistic community, are more persuasive than novel metaphors, i.e., new and creative uses of language.

Metaphors can give arguments more impact and intensity, but can also convey emotional attitudes and value judgments toward the topic of the metaphor (Semino 2008; Burgers et al. 2016). Metaphors are indeed “more emotionally engaging than literal expressions” (Citron and Goldberg 2014, p. 9), and can thus influence the evaluation of the arguments where they appear. Moreover, they are rarely affectively “neutral”, but they are rather “emotive metaphors”, i.e. positively or negatively valenced. As argued (Ervas et al. 2021), emotions are cognitive processes of framing, as they are cognitive processes that can redirect, modulate, and intensify attitudes

Although emotions are not explicitly intentional (Damasio 1994; LeDoux 1996), they can still influence our behavior and serve as useful predictors of actions. For instance, when we encounter negatively evaluated stimuli, they can trigger a sense of threat and prompt an immediate response (Rozin and Royzman 2001; Citron et al. 2014). On the contrary, previous studies demonstrated that a positively evaluated context can reduce or even eliminate potential biases in decision-making processes (Cassotti et al. 2012). Thus, the positive and negative evaluation of objects, people, and actions may significantly impact our reasoning abilities and evaluation of arguments (Caruana and Cuccio 2017).

4. Research question and hypotheses

Emotive metaphors entail a double (metaphorical and emotive) framing effect (Ervas et al. 2021) possibly influencing the evaluation of the *ad hominem* arguments. Therefore, the research question (RQ) leading the empirical investigation was the following:

RQ: Do the emotive metaphors in the metaphorical *ad hominem* argument lead people to evaluate *ad hominem* (fallacious) argument as sound?

To answer this research question, we formulated the following research hypotheses:

H1: Conventional metaphors (CM) lead participants to evaluate the *ad hominem* arguments as sound because, going unnoticed, they are more persuasive than both novel metaphors (NM) and their literal counterparts (LC).

H2: Negative metaphors (M-) lead participants to evaluate the *ad hominem* arguments as sound because they are more persuasive than positive metaphors (M+), having in general a stronger emotional impact than positive stimuli.

Based on the hypotheses, we expected that negatively-valenced conventional metaphors led participants to evaluate the *ad hominem* arguments as sound because they are persuasive (Sopory and Dillard 2002; Ottati and Renstrom 2010): conventional metaphors go unnoticed, and negative stimuli generally have a stronger emotional impact than positive stimuli (Ervas et al 2021).

5. Method

We planned a 3×2 within-subject experimental design, having 3 “metaphorical framing” conditions (novel metaphors vs. conventional metaphors vs. literal counterparts) \times 2 “affective framing” conditions (negative vs. positive valence). We did not consider a “neutral metaphor” affective condition, because in the set of metaphorical *ad hominem* arguments, appealing to emotions per definition, the evaluator is in an emotional relationship in processing the arguments’ premises. Moreover, metaphors occurring in metaphorical *ad hominem* arguments cannot be “neutral” or “impartial” from an affective point of view, as they entail framing effects with possible emotional impacts that extend beyond mere speech.

Forty participants (27F, 13M; $M_{\text{age}}=31.34$, $SD_{\text{age}}=16.42$) were presented with 8 *ad hominem* arguments with (4 positively-valenced, 4 negatively-valenced) novel metaphors (NM), 8 *ad hominem* arguments with (4 positively-valenced, 4 negatively-valenced) conventional metaphors (CM), and 8 *ad hominem* arguments with (4 positively-valenced, 4 negatively-valenced) literal counterparts (LC).

5.1 Materials

An example in English for each kind of *ad hominem* argument is provided in Table 1 (see Appendix, for all the *ad hominem* arguments in Italian). All participants spoke Italian as their first language and signed an informed consent form indicating that they understood the nature of their participation in the study (Ethics Committee of the University of Cagliari, n. 0077642).

	Novel Metaphor	Conventional Metaphor	Literal Counterparts
Negative valence	(P1) That friend herself says that friendships last a lifetime. (P2) That friend is a <i>grater</i> . (C) Friendships do not last a lifetime.	(P1) That friend herself says that friendships last a lifetime. (P2) That friend is a <i>harpy</i> . (C) Friendships do not last a lifetime.	(P1) That friend herself says that friendships last a lifetime. (P2) That friend is <i>unpleasant</i> . (C) Friendships do not last a lifetime.
Positive valence	(P1) That grandmother herself says that everyone should think for themselves. (P2) That grandmother is a <i>sponsor</i> . (C) None should think for themselves.	(P1) That grandmother herself says that everyone should think for themselves. (P2) That grandmother is a <i>support</i> . (C) None should think for themselves.	(P1) That grandmother herself says that everyone should think for themselves. (P2) That grandmother is <i>generous</i> . (C) None should think for themselves.

Table 1. Examples of metaphorical *ad hominem* arguments and their literal counterparts in English

The stories were presented in randomized order together with twelve fillers (6 clearly weak arguments and 6 clearly good arguments), each of them having two premises and a conclusion, as in the case of *ad hominem* arguments with literal counterparts. The fillers were designed to understand whether participants had a basic ability to distinguish clearly strong vs. weak arguments.

5.2 *Materials' preparation*

To provide the materials for the experiment, we pre-tested (1) the metaphors in the second premises of the arguments, (2) the literal counterparts of the metaphors, and (3) separate premises and conclusions of the arguments in a series of rating studies.

(1) We first chose a set of words ($N = 206$ nouns, GRADIT, De Mauro 2000) that could be used in the arguments. All of the words were selected based on their letter count (CM: mean = 6.25, SD = 1.20; NM: mean = 6.63, SD = 1.50; LC: mean = 7.87, SD = 2.09) and frequency (both CM and NM words belonged to the 'common terms' frequency category in the GRADIT, De Mauro, 2000). We selected the metaphors for the second premise of the metaphorical *ad hominem* arguments. The metaphors were selected based on their emotional meaning, familiarity, meaningfulness, and comprehension difficulty (Bambini et al. 2014). Participants rated these variables using a Likert scale ranging from 1 (very negative/unfamiliar/meaningless/easy) to 5 (very positive/familiar/meaningful/difficult). Metaphors deemed not meaningful enough (with a meaningfulness rating below 2) and too difficult to understand (with a difficulty rating above 4) were excluded from the study. Metaphors that did not have a clear emotional meaning (with a positive rating below 4 and a negative rating above 2) were not considered. Metaphors that had a clear emotional meaning (with a positive rating above 4 and a negative rating below 2) were categorized as positively or negatively valenced emotive metaphors. We ensured no ambiguity in our choice of words when creating novel metaphors and verified in the GRADIT that they had not been used before in a conventional metaphorical sense. (2) The participants were asked to generate properties, also known as 'feature listing', based on the preselected metaphors. They were asked to list at least three adjectives to describe each metaphor to determine the most frequently cited adjectives as literal counterparts for both conventional and novel metaphors. (3) We asked the participants to evaluate the truth and emotional meaning, both positive and negative, of all the premises and conclusions of the *ad hominem* arguments on a 1-5 Likert scale. We excluded conclusions that were already considered false by participants with a low truth value ($M_{\text{true}} < 2$, where M_{true} stands for the medium value of 'true') to avoid participants in the full study not

accepting the conclusions just because they were considered false without paying attention to the premises/conclusion connection.

5.3 Procedure

Participants were asked to evaluate whether the conclusion of the arguments followed from the premises: “Do you think that the conclusion C follows from the premises Ps?” with a “yes”/“no” answer. The main question was followed by these exploratory questions to better understand why they might have accepted the fallacious arguments as sound in the evaluation process:

Understandability: Do you understand the argument?

Convincingness: Is the argument convincing in any way?

Emotional appeal: Is the argument emotionally appealing?

Logical relation: Is the conclusion logically related to the premises?

Ambiguity: Is the ambiguity at any level influencing?

Belief in the conclusion: Do you believe in C (independent of P1 and P2)?

Participants were asked to rate the arguments for each question on the Likert scale of 1–5 (1 being least likely and 5 being most likely). Based on previous research (Ervas et al. 2021), the questions were used to understand how participants perceive the understandability, convincingness, emotional appeal, logical relation, ambiguity, belief in the conclusion of the arguments (Evans et al., 1983; Oakhill, Johnson-Laird and Garnham, 1993; Correia, 2011). We expected that participants would have different reasons for evaluating fallacious *ad hominem* arguments as sound compared to reasons for evaluating them as fallacious. For example, in general, identifying an ambiguity might lead to evaluating an argument as fallacious, whereas the emotional appeal of an argument might lead to accepting a fallacious argument as sound (and this might precisely be the case of *ad hominem* arguments).

5.4 Pilot study

Preliminary results of the pilot study ($N_{\text{participants}}=10$) showed that participants fall into the fallacy in the case of conventional metaphors when

compared to novel metaphors and literal terms, and in the case of negatively-valenced metaphors compared to positively-valenced metaphors.

6. Analysis

We performed the following statistical analyses:

1. A repeated measures analysis of variance (ANOVA) to assess the main effects of two within-subject factors, metaphorical (novel metaphor vs. conventional metaphor vs. literal counterpart) and affective framing (negative vs. positive valence), and the interaction of the two factors on the evaluation of the arguments' evaluation accuracy. We calculated the effect sizes, reporting the partial Eta squared coefficient (partial η^2) for ANOVA (Gravetter and Wallnau 2006): small effect size: $\eta^2 = 0.0099$; medium effect size: $\eta^2 = 0.0588$; large effect size: $\eta^2 = 0.1379$. We conducted then post-hoc analyses corrected for multiple comparisons (i.e., Bonferroni correction);
2. A repeated measures analysis of variance (ANOVA) to assess the main effects of two within-subject factors, metaphorical (novel metaphor vs. conventional metaphor vs. literal counterpart) and affective framing (negative vs positive valence), and the interaction of the two factors on the evaluation of the arguments' perceived properties. We calculated the effect sizes, reporting the partial Eta squared coefficient (partial η^2) for ANOVA (Gravetter and Wallnau, 2006): small effect size: $\eta^2 = 0.0099$; medium effect size: $\eta^2 = 0.0588$; large effect size: $\eta^2 = 0.1379$. We conducted then post-hoc analyses corrected for multiple comparisons (i.e., Bonferroni correction).
3. A correlation analysis (Pearson's r) of the six perceived properties of the displayed arguments (i.e., Understandability, Convincingness, Emotional appeal, Logical relation, Ambiguity, and Belief in the Conclusion) and the different types of conveyed messages (Negative and positive Conventional Metaphor, negative and positive Novel Metaphor, negative and positive Literal Counterpart) to explore their associations on the evaluation process of the *ad hominem* arguments' fallacy.

7. Results

The collected data can be found at the following OSF address: https://osf.io/bg2pm/?view_only=8bf-2pm/?view_only=8bfe16bb59084f07a3404c882367219d. We planned the following coding for the main question ‘Do you think that the conclusion C follows from the premises Ps?’: 0 for the incorrect answer ‘yes’, 1 for the correct answer ‘no’. We first checked the accuracy of the answers to literal fillers, to verify that the participants grasped how to distinguish between strong and weak arguments. We then calculated the mean (M) and standard deviation (SD) for accuracy (see Table 2).

	Novel Metaphor	Conventional Metaphor	Literal Counterparts
Negative valence	M=.24; SD=.29	M=.44; SD=.31	M=.36; SD=.30
Positive valence	M=.36; SD=.35	M=.43; SD=.33	M=.46; SD=.34

Table 2. Mean (M) and standard deviation (SD) values of correct answers

7.1 Analysis of variance for accuracy

The analysis of variance showed a significant main effect of the metaphorical framing type [$F(2,38) = 7.41, p = 0.002$, Wilk's $\Lambda = 0.72$, partial $\eta^2 = 0.28$] and the affective framing type [$F(1,39) = 6.51, p = 0.015$, Wilk's $\Lambda = 0.86$, partial $\eta^2 = 0.28$], and a nearly significant interaction between the metaphorical framing type and affective framing type [$F(2,38) = 3.09, p = 0.057$, Wilk's $\Lambda = 0.86$, partial $\eta^2 = 0.14$] on the beliefs that the conclusion (C) followed from the premises (i.e.: ad hominen fallacy). A post-hoc test, corrected for multiple comparisons (i.e., Bonferroni correction), was performed to determine the statistical significance of the difference between specific metaphorical framing conditions. The post-hoc analysis revealed a significant difference between the novel and conventional metaphorical framing conditions ($p < .001$), due to the higher number of correct answers in the latter condition, and between the novel metaphorical framing condition and no metaphorical framing condition (literal counterparts, $p = .011$), due to the higher

number of correct answers in the latter condition. No significant difference was found between the conventional metaphorical framing and no metaphorical conditions ($p = .531$) (see Fig. 1a). The significant main effect of the affective framing type is due to the lower number of correct answers in the case of *ad hominem* arguments with negative metaphors when compared to *ad hominem* arguments with positive metaphors (see Fig. 1b). A post-hoc test, corrected for multiple comparisons, was performed to assess the statistical significance of the interaction effect (see Fig. 1c): a similar level of accuracy despite the affective valence was observed only in the evaluation of *ad hominem* arguments with conventional metaphors.

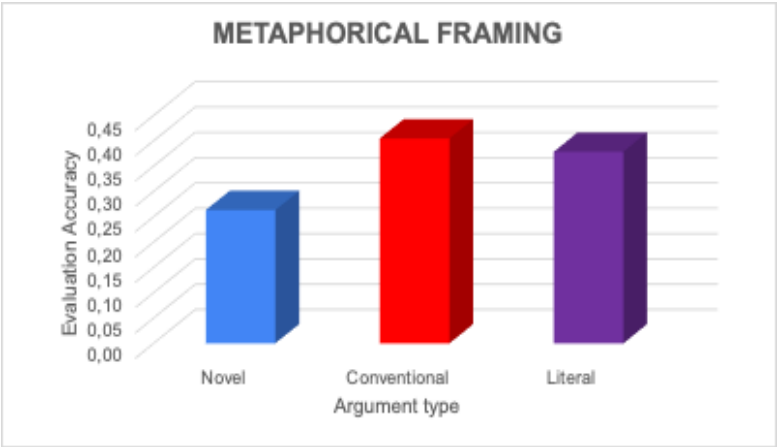


Fig. 1a Metaphorical framing effect

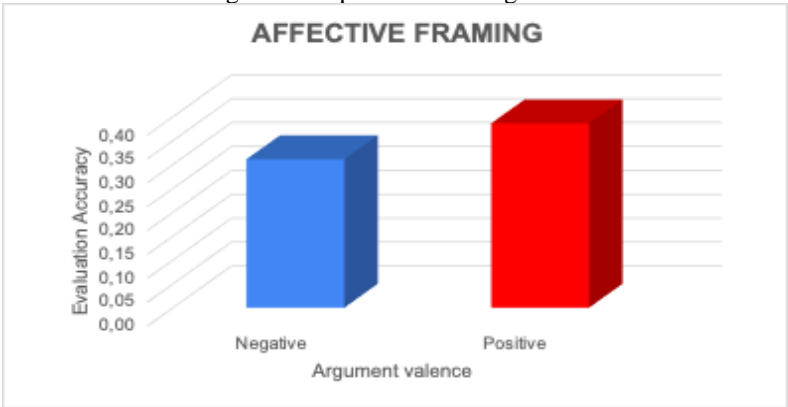


Fig. 1b Affective framing effect

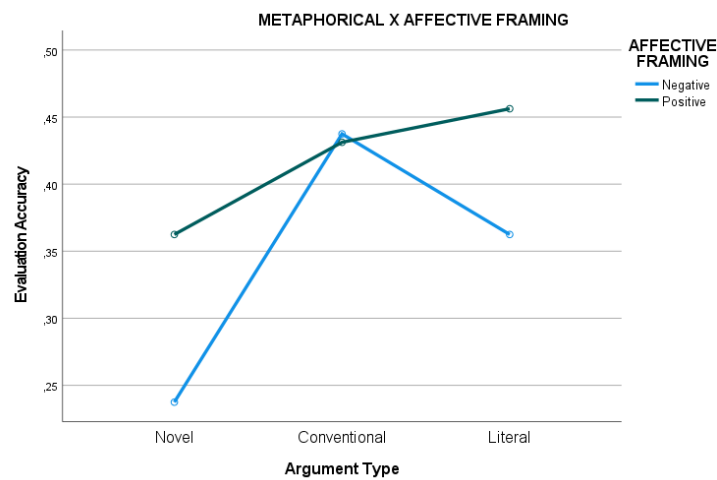


Fig. 1c Metaphorical x Affective framing effect

7.2 Analysis of variance for the perceived properties of the arguments

We then calculated the mean (M) and standard deviation (SD) of the six perceived properties of the displayed arguments (i.e., Understandability, Convincingness, Emotional appeal, Logical relation, Ambiguity, and Belief in the Conclusion) (see Table 3).

	CM-	CM+	NM-	NM+	LC-	LC+
Understandability (COMP)	M=2.90 SD=.83	M=3.18 SD=.93	M=2.42 SD=.75	M=2.59 SD=.83	M=2.97 SD=.86	M=3.25 SD=.86
Convincingness (CONV)	M=2.28 SD=.68	M=2.63 SD=.87	M=1.89 SD=.62	M=2.2368 SD=.7465	M=2.23 SD=.75	M=2.60 SD=.84
Emotional appeal (EMO)	M=2.10 SD=.65	M=2.25 SD=.85	M=1.68 SD=.57	M=1.84 SD=.69	M=2.20 SD=.71	M=2.36 SD=.87
Logical relation (LOGIC)	M=2.57 SD=.81	M=2.82 SD=.94	M=2.11 SD=.67	M=2.45 SD=.83	M=2.45 SD=.74	M=2.76 SD=.89

Ambiguity (AMBI)	M=2.67 SD=.77	M=2.45 SD=.71	M=3.01 SD=.87	M=2.68 SD=.67	M=2.51 SD=.82	M=2.40 SD=.85
Belief in the Conclusion (AGREE)	M=3.03 SD=.91	M=3.32 SD=.92	M=3.09 SD=.82	M=3.41 SD=.76	M=3.18 SD=.90	M=3.47 SD=.87

Table 3. Mean (M) and standard deviation (SD) values for each property . CM- = Negative Conventional Metaphor; CM+ = Positive Conventional Metaphor; NM- = Negative Novel Metaphor; NM+ = Negative Novel Metaphor; LC- = Negative Literal Counterpart; LC+ = Positive Literal Counterpart.

As for the ‘Understandability’ measure, the analysis showed a significant main effect of the metaphorical framing type [$F(2,36) = 18.58$, $p < 0.001$, Wilk’s $\Lambda = 0.49$, partial $\eta^2 = 0.51$] and the affective framing type [$F(1,37) = 17.57$, $p < 0.001$, Wilk’s $\Lambda = 0.39$, partial $\eta^2 = 0.32$], but no significant interaction between the metaphorical and the affective framing types [$F(2,36) = .40$, $p = .67$, Wilk’s $\Lambda = 0.$, partial $\eta^2 = 0.22$]. The post-hoc analysis revealed a significant difference between the novel and conventional metaphorical framing conditions ($p < .001$), due to the lower scores in the latter condition, and between the conventional metaphorical framing condition and no metaphorical framing condition (literal counterparts, $p < .001$), due to the higher scores in the latter condition. Participants evaluated the arguments as more understandable when the arguments were conveyed with a positive affective valence.

As for the “Convincingness” measure, the analysis revealed a significant main effect of the metaphorical framing type [$F(2,36) = 27.67$, $p < 0.001$, Wilk’s $\Lambda = 0.39$, partial $\eta^2 = 0.61$] and the affective framing type [$F(1,37) = 27.30$, $p < 0.001$, Wilk’s $\Lambda = 0.62$, partial $\eta^2 = 0.38$], but no significant interaction between them [$F(2,36) = .021$, $p = .67$, Wilk’s $\Lambda = 0.99$, partial $\eta^2 = 0.001$]. The post-hoc analysis showed a significant difference between the novel and conventional metaphorical framing conditions ($p < .001$), due to the lower scores in the latter condition, and between the conventional metaphorical framing condition and no metaphorical framing condition (literal counterparts, $p < .001$), due to the higher scores in the latter condition. Participants evaluated the arguments as more emotionally appealing when the arguments were conveyed with a positive affective valence.

As for the “Emotional appeal” measure, the analysis showed a significant main effect of the metaphorical framing type [$F(2,36) = 22.38$,

$p < 0.001$, Wilk's $\Lambda = 0.55$, partial $\eta^2 = 0.45$] and the affective framing type [$F(1,37) = 5.52$, $p = 0.024$, Wilk's $\Lambda = 0.87$, partial $\eta^2 = 0.13$], but no significant interaction between them [$F(2,36) = 0.27$, $p = .97$, Wilk's $\Lambda = 0.99$, partial $\eta^2 = 0.001$]. The post-hoc analysis showed a significant difference between the novel and conventional metaphorical framing conditions ($p < .001$), due to the lower scores in the latter condition, and between the conventional metaphorical framing condition and no metaphorical framing condition (literal counterparts, $p < .001$), due to the higher scores in the latter condition. Participants evaluated the arguments as more emotionally appealing when the arguments were conveyed with a positive affective valence.

As for the "Logical relation" measure, the analysis showed a significant main effect of the metaphorical framing type [$F(2,36) = 15.01$, $p = .011$, Wilk's $\Lambda = 0.78$, partial $\eta^2 = 0.46$] and the affective framing type [$F(1,37) = 7.42$, $p = .010$, Wilk's $\Lambda = 0.83$, partial $\eta^2 = 0.17$], but no significant interaction between them [$F(2,36) = 0.23$, $p = .80$, Wilk's $\Lambda = 0.99$, partial $\eta^2 = 0.012$]. The post-hoc analysis showed a significant difference between the novel and conventional metaphorical framing conditions ($p < .001$), due to the lower scores in the latter condition, and between the conventional metaphorical framing condition and no metaphorical framing condition (literal counterparts, $p < .001$), due to the higher scores in the latter condition. Participants evaluated the arguments more logically connected when the arguments were conveyed with a positive affective valence.

As for the "Ambiguity" measure, the analysis showed a significant main effect of the metaphorical framing type [$F(2,36) = 5.16$, $p < .001$, Wilk's $\Lambda = 0.78$, partial $\eta^2 = 0.23$] and the affective framing type [$F(2,36) = 15.01$, $p < .001$, Wilk's $\Lambda = 0.55$, partial $\eta^2 = 0.46$], but no significant interaction between the metaphorical and the affective framing types [$F(2,36) = 1.07$, $p = .35$, Wilk's $\Lambda = 0.94$, partial $\eta^2 = 0.56$]. The post-hoc analysis revealed a significant difference between the novel and conventional metaphorical framing conditions ($p = .006$), due to the higher scores in the latter condition, and between the conventional metaphorical framing condition and no metaphorical framing condition (literal counterparts, $p = .004$), due to the lower scores in the latter condition. Participants evaluated the arguments as more ambiguous when the arguments were conveyed with a negative affective valence.

As for the “Belief in the conclusion” measure, the analysis showed a significant effect only of the affective framing type [$F(1,37) = 5.16$, $p = .021$, Wilk’s $\Lambda = 0.78$, partial $\eta^2 = 0.14$], but no significant effect of the metaphorical framing type [$F(2,36) = 5.80$, $p = .12$, Wilk’s $\Lambda = 0.87$, partial $\eta^2 = 0.11$] and of the interaction between the metaphorical and the affective framing types [$F(2,36) = 0.16$, $p = .98$, Wilk’s $\Lambda = 0.99$, partial $\eta^2 = 0.001$]. Participants believed more in the conclusion when the arguments were conveyed with a positive affective valence.

7.3 *Correlation Analysis*

	NM-	CM-	L-
Understandability	0,493**	0,166	0,114
Convincingness	0,390*	0,118	-0,086
Emotional Appeal	0,180	-0,021	-0,169
Logical relation	0,584**	0,551**	0,401*
Ambiguity	-0,246	-0,008	-0,076
Beliefs in the conclusion	0,418**	0,380*	0,087

**0.01 (bidirectional), *0.05 (bidirectional)

Table 4. Correlations among investigated variables in the negative experimental conditions

Correlation analyses showed that perceived emotional appeal and ambiguity of the conveyed arguments were not associated with any type of argument. Regarding negative conventional arguments, these latter were positively associated only with two properties: Logical Relation ($r = .551^{**}$) and Beliefs in Conclusion ($r = .418^{**}$). Regarding the negative literal argument this latter was associated only with Logical relation ($r = .401^{**}$). In the case of negative novel metaphors nearly all the properties were positively associated: Understandability ($r = .493^{**}$), Convincingness ($r = .390^{**}$), Logical relation ($r = .584^{**}$), Beliefs in the Conclusion ($r = .418^{**}$).

	NM+	CM+	L+
Understandability	0,535**	0,562**	0,201
Convincingness	0,661**	0,596**	0,423**
Emotional Appeal	-0,276	-0,011	0,023
Logical relation	0,720**	0,612**	0,313
Ambiguity	-0,285	0,013	0,241
Beliefs in the conclusion	0,471**	0,356*	0,268

**0.01 (bidirectional), *0.05 (bidirectional)

Table 5. Correlations among the investigated variables in the positive experimental conditions

Correlation analyses showed that perceived Emotional appeal and Ambiguity of the conveyed arguments were not associated with any type of argument also in the Positive Affective Valence domain. Regarding positive Conventional arguments, these latter were positively associated only with the following (perceived) properties: Understandability ($r = .535^{**}$), Convincingness ($r = .661^{**}$), Logical Relation ($r = .720^{**}$), and Beliefs in the Conclusion ($r = .471^{**}$). Regarding the positive literal argument this latter was associated only with Understandability ($r = .562^{**}$), Convincingness ($r = .596^{**}$), Logical Relation ($r = .612^{**}$), and Beliefs in Conclusion ($r = .356^{**}$). In the case of positive novel metaphors nearly all the properties were positively associated: Understandability ($r = .535^{**}$), Convincingness ($r = .661^{**}$), Logical relation ($r = .720^{**}$), Beliefs in the Conclusion ($r = .471^{**}$).

8. Discussion

The results suggest that the participants evaluate the *ad hominem* argument as fallacious when a novel metaphor, rather than a conventional metaphor or a literal counterpart, is used to describe the arguer. This might be because conventional metaphors are so frozen in a linguistic

community that they go unnoticed by the speakers and acquire a status similar to their literal counterparts (Carston 2002; Bowdle and Gentner 2005). In this sense, conventional metaphors are more persuasive than novel metaphors in the evaluation of the *ad hominem* arguments, as they are not recognizable as metaphorical descriptions of the questioner, while novel metaphors are new and easily identifiable as metaphors. Thus, when considering H1:

H1: Conventional metaphors lead participants to evaluate the *ad hominem* fallacy as sound because, going unnoticed, they are more persuasive than both novel metaphors and their literal counterparts.

The hypothesis was just partially confirmed, as *ad hominem* arguments with conventional metaphors were evaluated as sound more when compared to *ad hominem* arguments with novel metaphors, but not when compared to *ad hominem* arguments with literal counterparts. In any case, the metaphorical framing proved to influence the arguments' evaluator, guiding their choices in deciding whether the conclusion follows from premises where the arguer is described metaphorically.

The results show that participants do not evaluate the *ad hominem* argument as fallacious when the questioner is characterized in negative terms, but rather they do evaluate the *ad hominem* argument as fallacious when the questioner is characterized in positive terms (Melton 1995). This might be because a negative description, either metaphorical or literal, makes the *ad hominem* fallacy more evident and thus recognizable as such. Instead, a positive characterization of the person delivering the argument makes it more difficult for the participants to refute the argument itself. In this case, however, we might question whether the argument is indeed an *ad hominem* argument, in the sense of a personal attack, precisely because of the positive characterization of the person delivering the argument. The results thus suggest that the perception of the questioner and especially the valence provided to her description largely influences the evaluation of the soundness of the *ad hominem* argument in general. Thus, when considering H2:

H2: Negative metaphors lead participants to evaluate the *ad hominem* fallacy as sound because they are more persuasive than positive metaphors, having in general a stronger emotional impact than positive stimuli.

The hypothesis was not confirmed: positive metaphors lead participants to evaluate the *ad hominem* fallacy as sound because they prefer to trust the arguments coming from people with a positive characterization. On the contrary, a negative characterization of the arguer helps the evaluator to understand that the *ad hominem* argument is fallacious. The affective framing anyway reveals to be influent in the argument evaluation, guiding it according to the affective valence attributed to the arguer.

The exploratory analyses revealed that *ad hominem* arguments with conventional metaphors are perceived as more ambiguous, but also less convincing and emotionally appealing, probably because they are nothing new and suffer from overuse in the linguistic community. Also, participants believe in the conclusion (independent of the premises) more when the *ad hominem* argument has a premise with a positive than a negative metaphor. This might be because stimuli with negative connotations are perceived as potential dangers that require attention for an immediate response (Rozin and Royzman 2001; Citron et al., 2014), while this is not the case for positive stimuli. In any case, participants claim that emotional appeal did not affect their evaluation of the *ad hominem* argument, even though emotional appeal is precisely the main feature of emotional arguments. Instead, the results suggested that when a negative characterization of the speaker is provided, participants are facilitated to evaluate the *ad hominem* argument as fallacious, precisely because they recognize the emotional appeal of the fallacy.

The correlational analysis (conducted separately for the negative and positive valence of the conveyed arguments) showed that the positive domain has more associations with arguments' perceived properties and this is in line with previous analysis showing that a positive characterization of the person delivering the argument makes it more difficult for the participants to refute the argument itself; indeed, in this case, a higher number of arguments' properties is needed in com-

parison to negative arguments. Being exploratory analyses, they cannot be properly considered explanations of the participants' behavior in evaluating the *ad hominem* arguments, but still, they can be considered participants' evaluations of the different perceived properties of the arguments and psychological measures concerning their evaluation of the arguments themselves. In turn, this might help us to better understand the underlying mechanisms of the *ad hominem* arguments' evaluation, and whether their answer to each question is somewhat correlated with the evaluation of the argument they provided.

9. Conclusion

The study shows that participants are facilitated to evaluate the *ad hominem* argument as fallacious when a negative rather than a positive characterization of the speaker is provided. Contrary to what was expected, the positive description of the person delivering the argument, especially when combined with a conventional metaphorical framing effect, makes it difficult for the evaluator to detect the *ad hominem* fallacy.

The main limitations of the study are the limited number of participants and the lack of reaction times measurement for the evaluation of the metaphorical *ad hominem* arguments. Further studies might compare the metaphorical *ad hominem* arguments in a narrow and wider context, enriched with a narrative on the person delivering the argument, and might consider and compare different typologies of metaphorical *ad hominem* arguments, for instance, the abusive and the circumstantial variants. Also, further studies might disentangle different aspects of the metaphorical *ad hominem* argument, such as the force of the argument, the degree of incoherence, and the credibility of the speaker, or the relationship between the default/negative evaluation of the speaker and the positive content of the reported speech.

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Appendix

	Novel Metaphor	Conventional Metaphor	Literal Counterparts
Negative valence	(P1) Proprio quel ragazzo dice che bisogna sempre concludere il proprio lavoro velocemente. (P2) Quel ragazzo è una rupe.	(P1) Proprio quel ragazzo dice che bisogna sempre concludere il proprio lavoro velocemente. (P2) Quel ragazzo è un baratro.	(P1) Proprio quel ragazzo dice che bisogna sempre concludere il proprio lavoro velocemente. (P2) Quel ragazzo è pericoloso.

	(C) Non è vero che bisogna sempre concludere il proprio lavoro velocemente.	(C) Non è vero che bisogna sempre concludere il proprio lavoro velocemente.	(C) Non è vero che bisogna sempre concludere il proprio lavoro velocemente.
	(P1) Proprio quel fidanzato dice che l'amore deve essere totalmente disinteressato. (P2) Quel fidanzato è una <i>granita</i> . (C) Non è vero che l'amore deve essere totalmente disinteressato.	(P1) Proprio quel fidanzato dice che l'amore deve essere totalmente disinteressato. (P2) Quel fidanzato è un <i>automa</i> . (C) Non è vero che l'amore deve essere totalmente disinteressato.	(P1) Proprio quel fidanzato dice che l'amore deve essere totalmente disinteressato. (P2) Quel fidanzato è <i>freddo</i> . (C) Non è vero che l'amore deve essere totalmente disinteressato.
	(P1) Proprio quell'amica dice che le amicizie durano per tutta la vita (P2) Quell'amica è una <i>grattugia</i> . (C) Non è vero che le amicizie durano per tutta la vita.	(P1) Proprio quell'amica dice che le amicizie durano per tutta la vita (P2) Quell'amica è un' <i>arpia</i> . (C) Non è vero che le amicizie durano per tutta la vita.	(P1) Proprio quell'amica dice che le amicizie durano per tutta la vita (P2) Quell'amica è <i>antipatica</i> . (C) Non è vero che le amicizie durano per tutta la vita.
	(P1) Proprio quel ragazzo dice che è giusto fare progetti molto ambiziosi. (P2) Quel ragazzo è un <i>polpo</i> . (C) Non è vero che è giusto fare progetti molto ambiziosi.	(P1) Proprio quel ragazzo dice che è giusto fare progetti molto ambiziosi. (P2) Quel ragazzo è un' <i>ameba</i> . (C) Non è vero che è giusto fare progetti molto ambiziosi.	(P1) Proprio quel ragazzo dice che è giusto fare progetti molto ambiziosi. (P2) Quel ragazzo è <i>pigro</i> . (C) Non è vero che è giusto fare progetti molto ambiziosi.

Posi- tive va- lence	(P1) Proprio quella nonna dice che ognuno deve pensare per sé. (P2) Quella nonna è uno <i>sponsor</i> . (C) Non è vero che ognuno deve pensare per sé.	(P1) Proprio quella nonna dice che ognuno deve pensare per sé. (P2) Quella nonna è un <i>supporto</i> . (C) Non è vero che ognuno deve pensare per sé.	(P1) Proprio quella nonna dice che ognuno deve pensare per sé. (P2) Quella nonna è <i>generosa</i> . (C) Non è vero che ognuno deve pensare per sé.
	(P1) Proprio quella ragazza dice che tutte le persone brutte devono essere amate. (P2) Quella ragazza è un <i>brillio</i> . (C) Non è vero che tutte le persone brutte devono essere amate.	(P1) Proprio quella ragazza dice che tutte le persone brutte devono essere amate. (P2) Quella ragazza è una <i>gemma</i> . (C) Non è vero che tutte le persone brutte devono essere amate.	(P1) Proprio quella ragazza dice che tutte le persone brutte devono essere amate. (P2) Quella ragazza è <i>bella</i> . (C) Non è vero che tutte le persone brutte devono essere amate.
	(P1) Proprio quell'uomo dice che si deve essere sempre seri. (P2) Quell'uomo è una <i>risata</i> . (C) Non è vero che si deve essere sempre seri.	(P1) Proprio quell'uomo dice che si deve essere sempre seri. (P2) Quell'uomo è una <i>sagoma</i> . (C) Non è vero che si deve essere sempre seri.	(P1) Proprio quell'uomo dice che si deve essere sempre seri. (P2) Quell'uomo è <i>divertente</i> . (C) Non è vero che si deve essere sempre seri.
	(P1) Proprio quella mamma dice che tutti devono essere lasciati liberi di fare ciò che vogliono. (P2) Quella mamma è un <i>forziere</i> . (C) Non è vero che tutti devono essere	(P1) Proprio quella mamma dice che tutti devono essere lasciati liberi di fare ciò che vogliono. (P2) Quella mamma è una <i>chioccia</i> . (C) Non è vero che tutti devono essere	(P1) Proprio quella mamma dice che tutti devono essere lasciati liberi di fare ciò che vogliono. (P2) Quella mamma è <i>protettiva</i> . (C) Non è vero che tutti devono essere

	lasciati liberi di fare ciò che vogliono.	lasciati liberi di fare ciò che vogliono.	lasciati liberi di fare ciò che vogliono.
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Appendix. Metaphorical *ad hominem* arguments and their literal counterparts in Italian