

Between Parrots and Genies. An Exploratory Study on Artificial Intelligence Metaphors among Higher Education Students

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Abstract: The term "artificial intelligence" is itself a metaphor, for it ascribes a distinctively human trait to algorithms that lack consciousness and emotion. Metaphors serve not merely to fill lexical gaps but to make novel phenomena comprehensible by connecting them to prior experience. They enable heuristic exploration of emergent realities and support the development of broader visions and intuitions. Investigating artificial intelligence (AI) metaphors allows researchers to uncover prevalent usage practices, expectations, concerns, and overarching perceptions of this evolving phenomenon. This approach is particularly valuable in educational contexts, where AI Literacy has become a significant research area encompassing both curriculum development and pedagogical applications. This exploratory study examined metaphor preferences among 60 second-year education students, focusing on their descriptions, usage practices, fears, and expectations concerning AI. Findings reveal that, while participants generally accept the "artificial intelligence" metaphor, considerable interest emerges in expressions that highlight its limitations, such as "artificial agent" and "stochastic parrot". The reflective analysis of metaphors proves educationally valuable as a pedagogical approach: identifying similarities and differences between human intelligence and the algorithms that approximate it remains a productive exercise for developing critical AI Literacy among future educators.

Keywords: Metaphor; Artificial Intelligence; AI Teachers' Perception; AI Literacy.



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1. Introduction: Perception, Metaphors and Artificial Intelligence

1.1. Perception

Artificial intelligence has been—perhaps excessively—at the centre of attention since November 2022, when the first Large Language Model became available to the general public. The educational and didactic field, one of the many sectors in which artificial intelligence may be applied, has demonstrated and continues to demonstrate

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considerable interest. Among others, the frameworks promoted by international institutions such as UNESCO (Miao & Cukurova 2024) are a sign of this interest. Artificial intelligence literacy constitutes an important area of research aimed both at understanding what should be taught at various levels of the school and university system, and at comprehending what support may be derived from artificial intelligence in facilitating teaching and learning processes (Panciroli & Rivoltella 2023, Ranieri, Cuomo & Biagini 2023).

One aspect that initially received limited attention was the perception of artificial intelligence. Identifying perceptions proves useful and functional in calibrating the instructional design attentive to the specific peculiarities of a particular group. Research on how technologies are perceived has a well-established tradition, one that is now expanding to include artificial intelligence (Murgia & Bruni 2024). A promising extension of this work lies in analysing the visions and metaphors that shape understandings of artificial intelligence

1.2. Metaphors

Metaphor is still considered as an entirely optional embellishment of discourse, to be relegated to the literary domain with a purely ornamental function, devoid of any cognitive or scientific dimension. If rhetoric is an instrument for convincing, metaphor, as a rhetorical device, would serve merely to persuade, or to illustrate by providing images or simplifications of matters deemed too complex for the presumed recipients of discourse.

Metaphor, as Aristotle reminds us, «consists in transferring to one thing the name of another, either from genus to species, or from species to genus, or from species to species, or by analogy», thus establishing an equality of relationships: «the second term stands to the first in an equal relationship to that of the fourth to the third»: «old age stands to life as evening to day, and therefore evening may be called the old age of the day, or [...] old age may be called the evening of life, or the sunset of life» (Aristotele, *Poetics*, 1457 b).

As the Aristotelian definition itself suggests, the function of metaphor extends well beyond mere embellishment. Metaphor serves multiple functions:

- Filling semantic gaps: when confronted with objects of which we lack full comprehension, it is instinctive and understandable to seek a connection with what is already known. Metaphor is thus capable of expanding vocabulary, providing both guidance for naming new objects and offering, for abstract terms, concrete similarities (Ricoeur 1981, p. 250).
- Understanding experience: metaphor is doubly linked to the experiential dimension. On the one hand, metaphors provide new meanings to our past, to daily activities, to what we know and believe (Lakoff & Johnson 2022, p. 187). On the other hand, in an entirely complementary manner, it is experience that renders metaphors intelligible, which can only be understood through their connection with daily and shared practices (Lakoff & Johnson 2022, p. 47).
- Heuristic function (Ricoeur 1981, p. 30): grasping similarities and differences opens up forms of re-understanding and interpretation of reality, increasing our

modes of feeling (Ricoeur 1981, p. 250-251), our aesthetic experiences and moral practices (Lakoff & Johnson 2022, p. 250).

- Creating visions and intuitions: in an increasingly complex context, with a growing mass of data in strong and continuous evolution, metaphor allows for overarching visions and intuitions (Ricoeur 1981, p. 118), making it possible to identify a key element (Lakoff & Johnson 2022, p. 136). Thus opens the dimension of the imaginary, reasoning through scenarios (Ricoeur 1981, p. 279) and offering, with approaches already partly tested, the possibility of hypothesising, also in relation to the digital, future developments (Greenfield 2017, pp. 291-303).

1.3. Metaphors of Artificial Intelligence

All this acquires particular significance in relation to the digital dimension: faced with such a radical change that has lasted, in its various phases, for decades, metaphors have offered and continue to offer a central tool in promoting the comprehension of the digital world. Terms, now commonplace, such as Internet or web, originate, and partly remain, metaphorical expressions (Markham & Tiidenberg 2020, Bruni 2025, pp. 29-31, Farkas & Maloney 2025).

The expression “artificial intelligence”, coined in 1955 by McCarthy (McCarthy et al., 2006), is a metaphor: the term intelligence, habitually used to indicate an exquisitely human trait, is employed and attributed to the algorithm to indicate new attributes deemed similar. Generative artificial intelligence, based on Large Language Models, reasserts this with greater force: language as an expression of human intelligence becomes a property of the machine.

The metaphor of artificial intelligence has been contested on the basis of a two-fold argument. The first derives from the observation that artificial intelligence «is a new form of capacity to act, or of agency [...] and not a new form of intelligence» (Floridi 2021, p. 139). Certainly, between artificial intelligence and the human species exists a fundamental gap: the former «lacks life, therefore they do not die, do not fear, do not become bored, do not become depressed nor enthusiastic [...] do not take any initiative and it always requires a human to activate them with a prompt, a need, a request. Devoid of life and will, they possess [...] not even a suspicion of consciousness or unconscious» (Ferraris 2025, p. 7). The expression artificial intelligence does not have a denotative function, of actual literal description, but, even in metaphorical terms—second observation—is not considered adequate and would be misleading as it would take for granted «the transformation of humans into androids and the superseding of the natural by the artificial» (Ferraris 2025, p. 23).

In light of such interpretations, it should be recalled that one of the domains traditionally explored by metaphor is precisely the comparison between organic and inorganic, starting from the Aristotelian example that compares the physical and inorganic datum of the rising and setting of the sun with birth and death, constitutive traits of that which is organic and alive. Seen in this light, the artificial intelligence metaphor serves a clear purpose: «the acceptance in society of the metaphor computational systems are brains is proved by its big influence in language, so expressions such as, the computer is thinking, it broke down, the software came up with a solution, this application is context aware, . . . are usual when we refer to computers. These

kinds of terms proceeding from the mind field are even used to name specific trends related to computerization, for instance machine learning or neuronal networks. [...] This situation leads us to the fact that the metaphors *thinking is computing* and *computing is thinking* are used interchangeably that reinforce the relationship between the concepts brain and computer as the foundation of Artificial Intelligence. In this case we consider brain and computational systems as the physical support and thinking and computing as the functional activity» (Carbonell, Sánchez-Esguevillas & Carro 2016, p. 151).

The delicate point is clearly to understand precisely what is meant by thought and intelligence, but it must be acknowledged that if artificial intelligence is capable of «classifying objects, evaluating and judging events, situations and cases; [...] identifying differences and similarities and, in doing so, recognising things, activities and people, even emotions; planning, and even estimating, predicting and forecasting» (Cabitza 2021, p. 33), we find ourselves confronted with functions comparable to human intelligence, however much this comparison may fascinate or concern us.

A series of other metaphors refer to artificial intelligence.

Among them, the most notable is the stochastic parrots (Bender et al. 2021). According to Emily Bender, the large language models of artificial intelligence are comparable to parrots speaking at random: texts generated by artificial intelligence are elaborated without any awareness, and the meaning that may be attributed to them derives from human perception. However, it must be acknowledged that generative artificial intelligence possesses the «capacity to produce linguistically syntactically and semantically appropriate content—a capacity traditionally considered the preserve of human intelligence—[and] transforms them into at least partially autonomous linguistic agents» (Roncaglia 2023, p. 109). In this sense, the metaphor of stochastic parrots presents itself as partly reductive.

Similarly, reproposing in relation to artificial intelligence the metaphor of the library or archive (Ferraris 2015, p. 20 and 207) may perhaps be reassuring but does not help to grasp the change that has occurred: the library is a significant and still current metaphor but one that illustrates more a phase of digital development rather than expressing its current potential. Memory has been largely and for some time now externalised: it is a process that began with the use of writing but which in the era of smartphones has reached its apex. The point for reflection concerns the externalisation of decision-making processes. The predictive function of artificial intelligence influences and modifies the procedures by which choices are made.

This line of inquiry also brings the oracle metaphor into view. Two particularly interesting—and apparently opposing—metaphors have been proposed for knowledge organisation. On one side there is the architect, that is a modality based «on the idea of strongly structured knowledge, organised according to solid and well-founded ontologies and hierarchies», of which libraries provide an example; and on the other there is the oracle, which refers to an organic model and therefore to «a sort of living organism capable of modifying itself and growing in forms not always well defined and comprehensible, not always rigorously analysable» (Roncaglia 2023, pp. XIII-XIV), the reference here being to generative artificial intelligence. The term oracle evokes elements of obscurity and imprecision that emphasise the statistical-probabilistic procedures not always transparent even to experts themselves (the well-

known “black box”). Developing this approach further, however, a further aspect should be noted: the oracle is an expression of divinity, it implies a requesting and above all an entrusting. Thus emerges, through the metaphor of the oracle, the ambivalence of artificial intelligence: we find ourselves before a tool, created by man, whose procedures and effects—which no one seems willing to renounce, at least for the useful and welcome aspects—are nonetheless partly unexpected, scarcely transparent, and displace us.

Further confirmation comes from the metaphor of loom and dice, inadvertently anticipated by Jonathan Swift in *Gulliver's Travels* (1726). Swift describes an imaginary voyage to the grand academy of Lagado, where the protagonist meets a scholar who shows him a wooden frame resembling a loom. Within it are arranged cubes similar to dice, connected by thin threads; on each face of the dice is pasted a piece of paper bearing a word, so that together they comprise the entire vocabulary of the language. By turning a set of cranks, the dice rotate and generate a different text each time. The purpose of this device sounds strikingly contemporary: since learning requires great effort, such an instrument would enable even the most ignorant person to write books on any subject. Swift's intent, of course, is satirical - he aims to ridicule the notion, already present in his time, of mechanically produced knowledge (Rodgers 2017). The output of Swift's loom is, with due sarcasm, dismissed as useless. Today, a machine operating on a fundamentally statistical-probabilistic basis - drawing on data far vaster than dictionaries and encyclopaedias, yet following a logic strikingly similar to Swift's invention - produces not disjointed sentences but texts we perceive as coherent. That we continue to speak of generative artificial intelligence through a multiplicity of metaphors signals that we have not yet fully processed our astonishment and bewilderment. As Melanie Mitchell observes, «AI researchers are still grappling for the right metaphors to understand our enigmatic creations» (Mitchell 2024).

2. The Research

2.1. Aims

Investigating metaphors of artificial intelligence - as well as metaphors of the web - brings to light both prevalent practices of use and the visions, expectations, and fears surrounding a phenomenon still in evolution. This inquiry takes on particular significance in the context of teacher training, where the metaphors teachers use both reflect and shape how they engage with artificial intelligence, whether for personal or pedagogical purposes. Accordingly, the main research question - Which metaphor is most appropriate for capturing the changes introduced by Large Language Models and generative artificial intelligence? - can be broken down into three sub-questions:

1. To what extent are teachers aware that the expression "artificial intelligence" is itself a metaphor?
2. Does the term "artificial intelligence" accurately represent the tools based on Large Language Models?
3. Which metaphor best captures the distinctive nature of generative artificial intelligence?

2.2. *The Instrument*

The questionnaire consisted of four sections and was administered via Google Forms, a tool selected for its accessibility, ease of use, and ability to collect both structured and unstructured data within a single instrument.

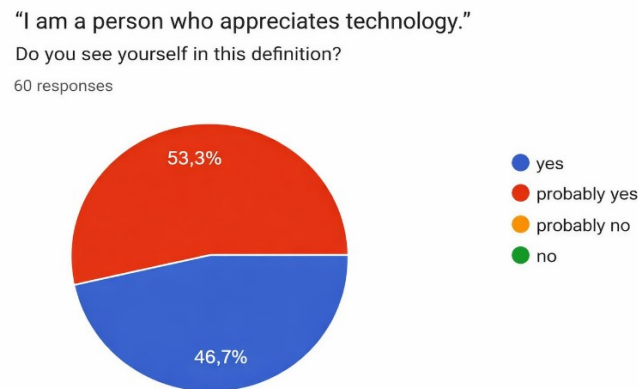
Section 1 collected demographic data, including age and gender. Section 2 addressed participants' relationship with technology: familiarity with digital tools is a key factor in how individuals engage with artificial intelligence. Section 3 explored metaphors of the internet and web. There is a logic of continuity in the metaphors that have accompanied the evolution of the digital; examining which metaphor best represents the web - along with its associated uses, fears, and expectations - provides a useful foundation. Section 4 focused specifically on artificial intelligence, addressing the themes outlined in the research questions through a mixed quantitative-qualitative approach, including an open-ended question to allow participants to explain their choices.

It should be noted that the question asking participants to identify the most appropriate metaphor for generative artificial intelligence included options beyond those introduced earlier. In addition to the most conceptually significant metaphors (artificial agent, stochastic parrot, oracle, brain/intelligence, library, black box, loom and dice), the questionnaire offered metaphors drawn from mythology (Prometheus), literature and cinema (Frankenstein, Golem, genie of the lamp, Pinocchio, magic mirror, sorcerer's apprentice), and expressions that have migrated from scientific discourse into everyday language (virtual assistant, ecosystem). This broader range was intended to capture a wide spectrum of nuances, particularly regarding the human-artificial relationship.

2.3. *Participants*

The questionnaire was administered in November 2025 to students attending the Instructional Technologies course (60 persons) in the second year of Primary Education Sciences at the University of Molise. As is understandable, the sample is predominantly female and 94.8 per cent fall within the 19-21 age bracket. It is important to note a positive relationship with technologies that suggests attitudes and practices devoid of fears towards digital innovation (Fig. 1).

Figure 1. Familiarity with technologies.



3. Findings and Results

In this work, we present and discuss the quantitative data relating to the section on metaphors of artificial intelligence.

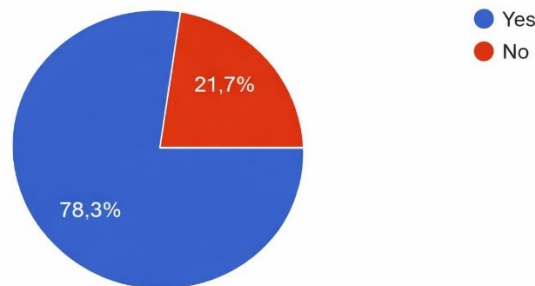
3.1. Is the Expression "Artificial Intelligence" a Metaphor?

The first research question aimed to ascertain the levels of awareness of the metaphorical nature of the expression "artificial intelligence". It should be noted that the survey was conducted in the final part of the Instructional Technologies course in which the theme was addressed explicitly: the presentation of artificial intelligence also included an examination, albeit brief, of the relevant metaphors. In this sense, the results (Fig. 2), faced with a large majority (78%) who recognise its metaphorical nature, show the persistence of a nonetheless significant proportion who consider the expression "artificial intelligence" as denotative: the algorithm is effectively and properly considered as intelligent.

Figure 2. Artificial intelligence as a metaphor.

Do you agree with this statement: "Artificial intelligence" is a metaphor?

60 responses



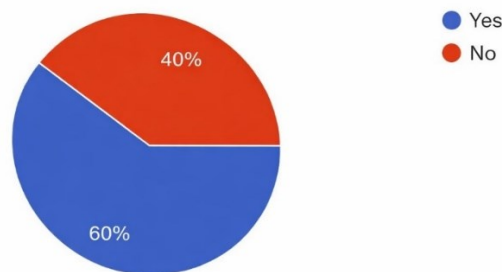
3.2. Is the Expression "Artificial Intelligence" an Adequate Metaphor?

The second research question moved beyond the recognition of the metaphorical nature of "artificial intelligence" to assess its perceived adequacy. To provide a concrete point of reference, the question explicitly named specific tools: "Do you consider "artificial intelligence" to be an adequate metaphor for describing tools such as ChatGPT or Gemini?" It should also be noted that, during the workshops, participants had the opportunity to experiment with and compare different generative artificial intelligence services. The results (Fig. 3) show that a majority - albeit a less pronounced one (60%) - considers the metaphor adequate. What generative artificial intelligence makes possible is perceived, not in literal terms but through the similitude proper to metaphor, as bearing a meaningful relation to human intelligence.

Figure 3. Artificial intelligence as an adequate metaphor.

Do you think "artificial intelligence" is a suitable metaphor for describing tools like ChatGPT or Gemini?

60 responses



3.3. Which Metaphor Best Expresses the Peculiarities of Generative Artificial Intelligence?

The third research question targeted those who did not consider "artificial intelligence" an adequate metaphor, and sought to identify which alternatives best captured, in participants' perception, the distinctive features of Large Language Models. The two most frequently selected options from the list provided were "artificial agent" (27.3%) and "stochastic parrot" (18.2%). Although these percentages refer only to the subset of respondents who found the AI metaphor inadequate, rather than to the entire sample, they nonetheless reveal a resistance to using intelligence as a criterion for understanding what we call artificial intelligence: the artificial, mechanical-statistical dimension is seen as fundamentally distant from human characteristics. In third and fourth place were "virtual assistant" (12.1%) and "genie of the lamp" (9.1%), two metaphors that, despite their different registers (one technical, the other fairy-tale), share an emphasis on the instrumental dimension: what matters is not intelligence, but being at the service of the human and fulfilling requests.

4. Discussion and Limitation

Based on these findings, three positions emerge. The first and most prevalent position, while aware of the metaphorical use of the term "intelligence," considers it an adequate framework for understanding Large Language Models. The functions these systems perform and the outputs they generate justify the – metaphorical – use of the expression "artificial intelligence": the comparison and interaction between human faculties and algorithmic capabilities is seen as a close and legitimate relationship. The second position, held by a minority, emphasises the gap rather than the similarity: a non-intelligent tool that uses language without any awareness of it. The third position, even smaller in this sample but potentially more widespread in other contexts,

takes an empirical approach and focuses on the practical support these tools can provide, regardless of how their nature is understood or classified.

A limitation of this research lies in the restricted sample, which is representative only of a specific context. This, however, also points to the way forward: further studies with larger and more diverse samples.

5. Conclusions

Working with metaphors undoubtedly has its limits. To borrow a now well-known distinction, placed by Ricoeur (1981) at the centre of his inquiry, there are living metaphors and dead metaphors, the latter being those that have exhausted their cognitive power. Moreover, even the richest metaphor illuminates only certain aspects of a phenomenon while concealing others, thus requiring the use of multiple, mutually incompatible metaphors (Lakoff & Johnson 2022, p. 283). Finally, metaphor must in any case be made explicit, if not unmasked (Ricoeur 1981, p. 331): it must be approached critically to grasp its uses and abuses, in the awareness that speculative discourse must accompany it. Yet this is precisely what makes metaphor an interesting challenge, all the more so in the age of digital technologies and artificial intelligence, where it functions simultaneously as a tool for understanding and, insofar as it offers partial or misleading visions, as an object to be deconstructed.

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