



Of bats and tables: How animacy impacts the brain in a variety of tasks

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Our brain is ancestrally wired to detect and process stimuli that are relevant for survival such as animates (i.e., entities that are alive, e.g., bats). Extensive research shows that many areas of our cognition give animates a special processing when compared to inanimates, even when inanimates may constitute a threat for life (vehicles). Recently, we obtained evidence that naming a simple animate noun may differ from that of an inanimate noun. This is probably due to attentional mechanisms favoring animates and a deeper conceptual processing of animacy to the detriment of other not-so-relevant features such as grammatical gender.

Surviving is the ultimate goal of any living being. As a result, our brain shows special sensitivity to detect and respond to any event or stimulus perceived as critical for surviving. In this sense, our brain seems to be sensitive to animate stimuli. Animates refer to entities that are alive (e.g., worms, bats), whereas inanimate things lack the ability to move or are simply inert (e.g., leaves, tables). Indeed, animacy has been shown to affect the way we perceive and react to the world from a very young age. According to the Animate Monitoring Hypothesis of New et al. (2007), animates possess an attentional advantage that explains why babies as young as 11-month-old



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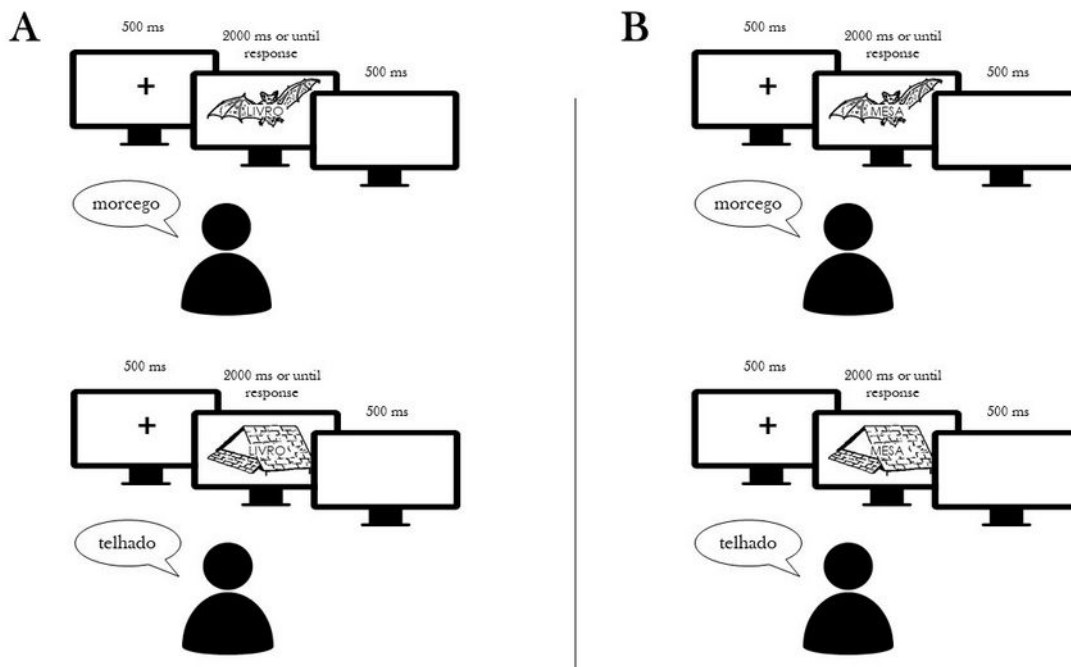


Figure 1.- A) Gender congruency between target (masculine) and distractor (masculine).
 B) Gender incongruency between target (masculine) and distractor (feminine).

are consistently faster and more accurate at detecting changes in animals (human and non-human) than in inanimate objects, even when these may constitute a threat for survival (e.g., vehicles in motion; Hofrichter et al., 2021). This attentional advantage entails a disadvantage for inanimate stimuli since their detection is distracted by the presence of humans or animals (Altman et al., 2016). In fact, animate entities displayed in images have been shown to draw our attention in a way that is highly independent from the context. Hence, the pictorial context in which the human being or animal we are observing is inserted does not really matter so much for we are always going to grant them special attention (contrary to inanimate things). In fact, not only perception and attention but also memory is impacted by animacy, as animate stimuli are better remembered than inanimate stimuli (Nairne et al., 2013).

How does animacy impacts language comprehension and production? In Sá-Leite et al. (2021), we specifically asked: are there differences in the processes happening in our mind when we merely pronounce "bat" in comparison to "table"? More specifically, we focused on a linguistic feature called grammatical gender, which is distinct from biological sex. In languages like Spanish or Portuguese, nouns for inanimate objects are arbitrarily classified into categories (masculine/feminine) not related to meaning (in Spanish, "mesa" [table] is feminine, but "libro" [book] is masculine). Certain animate nouns are also classified according to grammatical gender (e.g., "bat" is masculine, and "giraffe" is feminine) regardless of their sex (male/female). We wanted to examine if there were differences in the way our brain retrieves the grammatical gender value of a noun depending on whether it refers to an animate or an inanimate entity, even though gender is an abstract linguistic characteristic.

We hence recruited Portuguese participants and asked them to name aloud a series of pictures while ignoring superimposed written distractor nouns (see Figure 1). The target nouns (those used to name the pictures) and the distractor nouns could have the same or different gender (target "morcego" [bat] and distractor "livro" [book] are both masculine in Portuguese, forming a gender-congruent pair; but "morcego" and "mesa" [table] form a gender-incongruent pair, because "mesa" is feminine). Following previous literature with this type of paradigm, we know that participants cannot avoid the processing of the written word that they are trying to ignore. Indeed, differences are found in the time that participants take to start naming the pictures

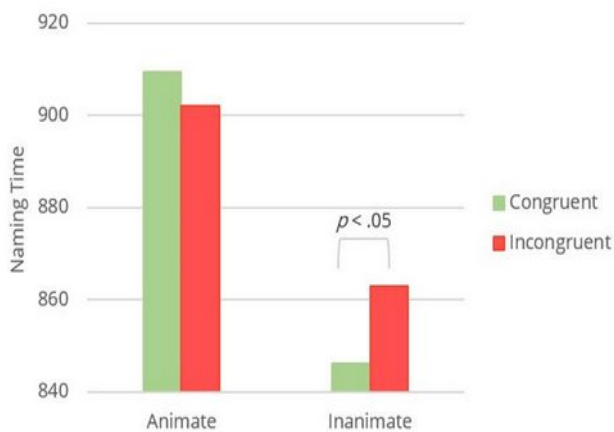


Figure 2.- Naming times for animate and inanimate targets in gender congruent and incongruent conditions.

hypothesis, our animate targets may have recruited the attention of the participants to a degree in which the distractor is not even perceived. On the other hand, following the notion that animate nouns are semantically richer than inanimates, the processing of meaning may have been prioritized over the processing of grammatical abstract features, which may not be as relevant. Thus, when preparing the production of “morcego”, our brain may skip the selection of a gender value to preserve cognitive resources. This is in line with the fact that participants needed overall more time to name the animate than the inanimate targets, a result that might be signaling their higher semantic richness. Future studies should explore both ideas in more detail.

In conclusion, these findings suggest that our brain's sensitivity to animates is spread among many areas of cognition and is led by ancient priorities that are still printed in our cognitive mechanisms. Note that, although it is more useful for individuals today to be especially aware of changes in, for example, moving vehicles, the processing of non-human animals greatly capture our attention—more than vehicles.

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when these are gender-congruent in comparison to when they are incongruent (e.g., Cubelli et al., 2005). In our study, we expected participants to be faster when naming targets whose gender matched that of the distractor (gender-congruent pair). Yet, we also manipulated the animacy of the target nouns, so that they could be animate or inanimate (“morcego” vs. “telhado” [roof, masculine], respectively). Distractors were kept inanimate.

Our results showed that the simple naming of an image is affected by animacy: inanimate targets showed the advantage for gender-congruent pairs, but animate targets did not show any advantage/disadvantage (see Figure 2).

We propose two interpretations of this finding. On the one hand, following the Animate Monitoring

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