

Toivonen, Ida. 2026. The tripartite distinction between grammar, cognition, and the world.
In: Mary Dalrymple, Tina Bögel, Annette Hautli-Janisz, Ronald M. Kaplan, Annie Zaenen (eds.),
Parallelism, Interconnection, and Complementary Distribution: Papers in Honor of
Miriam Butt and Tracy Holloway King, 381–403. Konstanz: PubliKon.
<https://doi.org/10.82583/eym4hr19>

The tripartite distinction between grammar, cognition and the world

Ida Toivonen
Carleton University

1 Introduction

In the course of their work, theoretical linguists are likely to encounter tricky examples, contradictory judgements and gradient acceptability. There are many types and sources of linguistic data: grammatical descriptions (such as traditional grammars), written and spoken corpora, introspective judgements, psycholinguistic studies, neurolinguistic studies, etc. The data can be bewildering and frustrating.

This paper is intended to be a reminder that we do not need to account for all language-related information in our grammatical analyses and theories. Many generalizations that can be gleaned from linguistic data are not governed by grammatical principles. For example, suppose we learn that farmers talk about the weather more than stockbrokers do. This might not be irrelevant to a linguist. The frequency of use of vocabulary items relating to weather might have interesting consequences on pronunciation and processing that linguists may (or may not) want to study. However, our grammars do not need to explain *why* farmers talk about the weather a lot. It is simply not a grammatical question. Not all generalizations that we can learn from analyzing linguistic data are directly relevant to understanding language. Some generalizations simply follow from facts about the world. For example, farmers talk about the weather, presumably because it is relevant to them. Kids talk about toys more than grown-ups, presumably because kids care more about toys. We don't need to account for these observations grammatically.

Matters are further complicated by the fact that we only have access to facts about the world through our own understanding of the world. For example, suppose that a psycholinguistic study finds it is easier for participants to parse the sentence “penguins fly” than “penguins swim”, even though penguins are much better swimmers than fliers. The explanation for the results of the psycholinguistic study might be that people conceptualize penguins as “the kind of entities that fly”, which influences our linguistic processing. This hypothetical case is intended to illustrate that people (who are language users and can serve as linguistic consultants) only have access to facts about the world through their cognitive construal of what the world is like.¹

This paper is about the interplay between language, our cognitive construal of the world, and the actual world. These three are distinct from each other, but they nevertheless influence each other. The body of this paper explores this tripartite distinction with data sets that pertain to two intricate topics of linguistic importance. Section 2 is about linguistic arguments and core event participants. Section 3 is about animacy. Finally, section 4 offers some concluding remarks.

2 Linguistic arguments and conceptual core participants

The conceptualization of an event (e.g., *sleep*) involves entities that participate in the event (e.g., *someone who sleeps*). Those entities can be people, things, locations, manners, time spans, etc., and they will be referred to here as *event participants* (even though *participant* is a bit of an awkward term for entities that are not people). Some conceptual event participants are obligatory in order for the event to take

¹This point has been argued for years by, for example, Ray Jackendoff (e.g., Jackendoff 2002: ch. 10).

place. There is a strong tendency for such obligatory event participants to be linguistic arguments. In fact, Dowty (1982) proposes that entailed event participation is one of two criteria that distinguishes arguments from adjuncts.²

Consider examples (1)–(2):

- (1) Pat napped.
- (2) Sam quietly polished the chair in her workshop last night.

A napping event entails the presence of a single participant, someone who naps, and the verb *nap* thus takes one argument, which in (1) is *Pat*. A polishing event entails the presence of two participants, someone who polishes and something that is polished, and the verb *polish* takes two arguments. In (2), these arguments are *Sam* and *the chair*. The other phrases in (2) (*quietly, in her workshop, last night*) are adjuncts.³

Even though obligatory event participants often align with linguistic arguments, this is not always the case. The cognitive construal of obligatory event participants is not the same thing as the grammatical argument structure of verbs. One clear example of a mismatch between obligatory event participants and linguistic arguments is expletive subjects:

- (3) It is raining.
- (4) a. It seems that the party is over.
b. The party seems to be over.

In (3) the pleonastic *it* is non-referential. A raining event arguably does not entail any participants, but the verb *rain* requires a subject syntactically. A raising-to-subject verb like *seem* entails only an event, which in (4) is *the party is over*. However, the syntax requires two arguments: a subject and a clausal complement. Using LFG terminology, the clausal complement can be a COMP (a closed complement, as in (4a)) or an xCOMP (an open complement, as in (4b)).

The expletive examples would quite standardly be analyzed as grammar-internal mismatches between semantics and syntax. For example, a common analysis of *seem* would be that it takes one semantic argument and two syntactic arguments. This raises the question of whether *all* cases of mismatches between entailed participants and arguments could, in fact, be analyzed as grammar-internal mapping mismatches. Sections 2.1–2.5 list several sets of examples that, I argue, involve mismatches between core conceptual participants and semantic arguments. Section 2.6 points out that there are some entailed core participants that pattern with linguistic adjuncts, not arguments, in terms of omission in discourse pro-drop languages. Section 2.7 offers some concluding remarks.

2.1 Prices

Dowty (1982) notes that his argumenthood criteria might need to be revised in light of certain examples. He highlights verbs like *buy* and *sell* as possible examples. The entailment criterion indicates that *buy*

²Dowty's other criterion is *subcategorization*: arguments can only be added to verbs that subcategorize for them. Dowty intends for the subcategorization criterion to block superfluous arguments, while the entailment criterion ensures the inclusion of all arguments, with the caveat that arguments may be unmentioned but implicitly understood. The effects of the criteria can be compared to the effects of the LFG principles of Coherence for subcategorization and Completeness for entailment (see, e.g., Bresnan et al. 2016 and Butt & King 2015 for Completeness and Coherence). As far as I can tell, Dowty's subcategorization test can fulfill the role of Koenig et al.'s (2003) SPECIFICITY constraint, which limits linguistic arguments to participants that are entailed specifically by the individual verb. This rules out roles that are entailed by most (perhaps all) verbs: any activity or state must take place in a time or location, yet times and places are not typically arguments of the verb. This is because they are generally required in order for anything to happen, but they are not specifically subcategorized for by the verb.

³Adjuncts are phrases that contribute extra information that is not seen as integral (Barrie 2024). The argument-adjunct distinction is controversial, yet it is adopted in most (perhaps all) theoretical frameworks. For discussion and references, see, e.g., Somers (1984), Van Valin & LaPolla (1997), Hole (2015), Barbu (2020), and Toivonen (2021).

and *sell* are four-place predicates since those verbs require a buyer, a seller, something purchased and a sum of money. Dowty notes that this is “a somewhat suspicious result” (Dowty 1982: fn. 5).

Indeed, although some verbs (e.g., *cost*, *pay*) do take price phrases as arguments, prices are adjuncts and not arguments when they occur with the verbs *buy*, *sell*, and also *rent*, *lease*. For example, *for \$300* in (5) does not display typical argumenthood characteristics.

- (5) Seren bought a bike for \$300.

The price phrase in (5) patterns with adjuncts according to standard argumenthood diagnostics. For example, it can be *wh*-coordinated (6), and it can be left behind when the VP is preposed (7).⁴

- (6) When and at what price did Seren buy a bike?
 (7) Seren wanted to buy a bike for \$300, and buy a bike she did for \$300.

It should be noted here that syntactic argumenthood diagnostics need to be taken with a grain of salt. For example, even though the coordination of argument *wh*-phrases is restricted (e.g., **What and to who(m) did Frank give?*), it is not subject to a complete ban. Non-obligatory arguments can often be coordinated with adjuncts (Larson 2013, Melchin & Toivonen 2018, a.o.). Furthermore, many argumenthood tests do not hold cross-linguistically, or they are only implicational, or they might involve unusual constructions where acceptability judgements vary.

However, price phrases clearly pattern with adjuncts in terms of omissibility. Like adjuncts, price phrases are optional. Argument phrases can of course also be omitted under certain circumstances (see Van Luven & Toivonen 2024 for discussion), but price phrases differ significantly from omissible arguments: psycholinguistic studies show that not only are prices optional, they are in fact almost never mentioned in sentence completion tasks for verbs like *buy*, *sell*, *rent*, etc. (Barbu 2015, Barbu & Toivonen 2016b).

Empirical evidence thus supports Dowty’s (1982) suggestion that verbs such as *buy* do not take price arguments even though prices are entailed participants in *buying* events. The verb *buy* entails a price: without a price, the event it is no longer *buying*, it is instead a *taking* event. The price is therefore a core conceptual participant of buying events. However, the price phrase patterns linguistically with adjuncts, not arguments.

2.2 Instruments

Instrument phrases such as *with a thick brush* in (8) are similar to prices with respect to argumenthood.

- (8) Sara drew the portrait with a thick brush.

An instrument is required for a drawing event to take place: in order to draw, you need something to draw with. Other examples of verbs whose meanings entail instruments include *slice*, *cut* and *paint*. These instruments pattern linguistically with adjuncts: they can be *wh*-coordinated (9), they can be left behind when the VP is preposed (10), among other commonly assumed criteria.

- (9) Where and how did you cut the bread?/ Where and with what did you cut the bread?
 (I cut the bread with a borrowed knife in the kitchen.)
 (10) Monica wanted to cut the bread with a dull knife, and cut the bread she did with a dull knife.

Furthermore, like price phrases, instrument *with*-phrases are optional, and psycholinguistic studies show that they are consistently omitted in sentence completion tasks (Barbu 2015, 2020, Barbu & Toivonen 2016a,b).

Note that there is no ban on instrumental arguments in principle. In examples (11) and (12), *the rusty key* is an argument:

⁴An anonymous reviewer suggests that *for what price* might be a better wording. It seems that *at what price*, *for what price* and *for how much* are all possibilities here.

- (11) The rusty key opened the door.
(12) Sara used the rusty key to open the door.

However, when instruments are expressed as *with*-PPs, they do not pattern with syntactic arguments.

Instruments have been extensively studied in the theoretical and psycholinguistic literature, and one point of contention has been the argumenthood status (see, e.g., Tutunjian & Boland 2008, Koenig et al. 2003, Rissman 2013, Rissman et al. 2015, Barbu & Toivonen 2016b, Barbu 2020, Russo 2021). One reason for the controversy is that there is a class of verbs whose meaning entails the presence of an instrument, yet the instrument phrases do not pattern with linguistic arguments. In other words, instruments are often core conceptual participants of events which are denoted by verbs that do not take instruments as arguments.

2.3 Verbs that entail more than three participants

Natural languages seem to limit the number of arguments of verbs to a low number. The maximum number of arguments is probably three, or four if we include causatives and applicatives. This limitation has been noted by numerous scholars; for example, Tesnière (1959), Hornstein & Nunes (2008), Kearns (2011), Marantz (2013). However, the meaning of a verb can entail more than three event participants. For example, *buy* and *sell* entail four participants: a buyer, a seller, something that is bought/sold, and a price (see section 2.1 above).

The verb *lease* entails five event participants, as pointed out by Apresjan (1992: p. 117). Apresjan lists the following participants of *lease*: (1) he who leases, (2) that which is leased, (3) he from whom it is leased, (4) that in exchange for which it is leased (i.e. the pay), and (5) the period of time (for which it is leased). The period of time is conceptually necessary: if the transaction is not time-limited, then we are describing a selling event, not a leasing event. It is possible to find examples where all of these participants are expressed in the sentence, but they are not all linguistic arguments. Example (13) is retrieved from the *www*:⁵

- (13) The town of Hillsborough leased it to them for 99 years at \$1.00 a year.

The verbs *lease* and *rent* are ambiguous between a causative and non-causative reading. The causative reading takes three linguistic arguments, and the non-causative reading takes two linguistic arguments.

Other verbs whose meaning entails many participants are *dispatch*, *elope* and *expel*. The verb *dispatch*, for example, entails six participants according to Apresjan (1992: p. 140): a subject, an object, a point of arrival, a point of departure, a goal, and a time period. Not all of these are linguistic arguments.

The verbs provided here all serve to illustrate the same point: the number of possible arguments is restricted to three (or four), but the number of conceptual participants is not as strictly limited.

2.4 Classes of verbs with related meanings

Some groups of verbs share a basic meaning and entail the same number of event participants, yet they differ in argument structure. There is, for example, a long list of verbs that refer to the ingestion of food: *eat*, *devour*, *gobble*, *munch*, *nibble*, *dine*, etc. All of these verbs entail an eater and something that is eaten. However, they differ in how (and whether) these entailed participants are expressed linguistically. The verb *eat* is optionally transitive and *devour* is obligatorily transitive. For *gobble*, many speakers require a verbal particle *up/down* along with an object. The verbs *munch* and *nibble* take oblique arguments. Finally, *dine* seems to be intransitive in its basic use, with the food optionally mentioned as an *on* PP.

There is similarly a large number of verbs that refer to verbal expression: *say*, *talk*, *chat*, *jabber*, *discuss*, *tell*, *relay*, *utter*, *babble*, etc. These verbs display syntactic and semantic differences (see, e.g., Grimshaw 2015), but they all entail someone uttering something, something that is uttered, and (possibly)

⁵<https://www.orangehistorync.org/our-building>

a listener or companion. Crucially, however, these verbs differ in their linguistic argument structure. For example, *babble* takes one argument, *discuss* takes two arguments, and *tell* takes three arguments.

2.5 Applicatives

Sections 2.1–2.4 were concerned with entailed participants that are not linguistic arguments. This section turns to applicatives, where the opposite can occur: applied arguments are not necessarily conceptual core participants of the event.

Although applicatives often involve the promotion of an oblique argument to a direct object, they also sometimes promote non-arguments. This is possible in Rutooro, as shown by several of the examples in Isingoma (2021). One of the examples Isingoma provides is (14), where the time expression *emyaka ikumi* is an applied argument, licensed by the applicative morphology:

- (14) Jeeni a-ka-som-er-a Orufaransa emyaka ikumi.
 Jane 3SG-PAST-study-APPL-FV French years ten
 ‘Jane studied French for ten years.’

The meaning of *-som-* ‘study’ does not entail a time expression as a core participant.

Consider next the Mountain Balinese example (15), from Udayana (2014):

- (15) I Dora ngadep-ang okke umah.
 ART name AV.sell-APPL 1 house
 ‘I Dora sold the house for me.’

The English translation of (15) is ambiguous: the PP *for me* can mean that the action was done ‘for my benefit’ (e.g., in order to please me) or ‘in my stead’ (I was supposed to sell the house, but Dora did it instead). Udayana (2014) explains that the Mountain Balinese interpretation is that Dora is deputized to sell the house. This semantic role (in someone’s stead) is not an entailed core participant of *sell*. Arka (2014) provides further examples from a different variety of Balinese.

Languages without applicative morphology may have applicative-like constructions that promote non-arguments to arguments. Consider, for example, English benefactive NPs, illustrated by *the children* in (16):

- (16) Clara drew the children a nice picture.

Benefactives can be added as object arguments in English, provided that certain restrictions are satisfied (see Toivonen 2013 for discussion, examples and further references). For example, note that *the children* in (16) cannot have a deputizing reading, unlike *okke* in (15). The NP *the children* is a linguistic argument in (16), even though it is not an entailed participant of *draw*.

Another applicative-like construction involves so-called personal datives, illustrated in (17):⁶

- (17) I’m gonna write me a letter to the president.

The use of personal datives is restricted to certain geographical areas (very roughly, to the Southern parts of the United States). The construction signals a special involvement of the subject in the event (Bosse 2014). The construction is linguistically restricted by specific semantic and syntactic requirements (Hutchinson & Armstrong 2014, Wood & Zanuttini 2018). For example, the pronoun is co-referential with the subject even though it does not display reflexive morphology. Note that the construction adds an extra linguistic argument, but this argument does not refer to any additional conceptually necessary event participant.

⁶Example (17) is from Conroy (2007), who also lists additional examples. For further examples, see Hutchinson & Armstrong (2014), Bosse (2014), and Wood & Zanuttini (2018). A reviewer also suggests the following example from the song *Peaches* by The Presidents of the United States of America: *Movin’ to the country/ Gonna eat a lot of peaches/ Movin’ to the country/Gonna eat me a lot of peaches*.

The examples in this section all involve linguistic arguments that are introduced or licensed by applicative morphology or applicative-like constructions. Applied arguments may be promoted oblique arguments, but this is not the case in any of the examples here. The examples above from Rutooro, Mountain Balinese, and English involve linguistic arguments that do not correspond to core event participants associated with the meaning of the verb.

2.6 Discourse pro-drop

Some observations from so-called discourse (or “radical”) pro-drop provide further illustration that the mapping between entailed core participants and linguistic arguments is not one-to-one. In discourse pro-drop languages, arguments such as subjects and objects can be dropped even though no agreement morphology on the verb or other morphology provides information about the reference of the dropped arguments.⁷ A Cantonese example from Matthews & Yip (2011: p. 97) serves as illustration:

- (18) a. Léih jūng-mh-jūngyi sihk Chiuhjāu choi a?
 you like-not-like eat Chiuchow food SFP
 ‘Do you like Chiuchow food?’
 b. Gánghaih jūngyi lāi!
 of-course like SFP
 ‘Yes, of course I do.’

The omission of arguments does not lead to confusion in the conversation, because pro-drop is only permitted when certain discourse requirements hold. For example, the referent must be accessible from context (see, e.g., Rosén 1998 for Vietnamese and Frascarelli & Casentini 2019 for Mandarin). Since the reference of the omitted pronoun is clear, I assume that it is represented in the semantics, even though it is not included in the overt syntax.

By contrast, there are no discourse requirements that restrict the omission of adjuncts. Adjunct phrases are easily omitted, and *included* only when they are relevant to the question under discussion (Brunetti et al. 2021, Van Luven & Toivonen 2024).

Sections 2.1 and 2.2 pointed out that instruments and prices are entailed core participants of certain verbs (e.g., *cut* for instrument, *buy* for price), even though they are not linguistic arguments. These non-argument core participants pattern with *adjuncts* not *arguments* in radical pro-drop languages: they are freely omitted. No particular context is required for them to be omitted. Even if the price is not accessible from the context, you can say the equivalent of ‘I bought a car’ without mentioning the price.

Pro-dropped arguments are represented in the semantic module of the grammar, but unexpressed adjuncts are not (at least not routinely) represented in the semantics, even when they are conceptually core event participants. Table 1 makes explicit at what levels the different types of participants are present. For concreteness, I use the LFG terms s-structure (s-s) and c-structure (c-s), which refer to semantic structure and constituent structure, respectively. The conceptualization of what is a core participant in an event is extra-grammatical. S-s and c-s are grammatical levels. LFG avoids the use of empty categories in the phrase structure: if something is present at c-s, it is overtly expressed. Overt adjuncts will of course be represented at s-structure and c-structure, just not as arguments. Covert adjuncts are not represented linguistically at all, even when they are conceptually entailed event participants.

In sum, discourse pro-drop languages place certain discourse restrictions on the omission of arguments and inclusion of adjuncts. Some phrases that denote core event participants (prices, instruments, etc.) pattern with adjuncts and not arguments in terms of these discourse restrictions on omissibility. This is not surprising on a view where participants that are conceptually core to the event are not necessarily

⁷The rich literature on radical pro-drop has debated whether the phenomenon is best analyzed as true pro-drop (implying null pronouns), argument ellipsis or VP-ellipsis. This literature has revealed differences between types of radical argument omission, both language-internally and cross-linguistically. This research will not be reviewed here, but see the recent work by Ke (2025) for Mandarin, Mizuno (2025) for Japanese, as well as Simpson & Ngo (2022) and the classic work by Rosén (1998) for Vietnamese.

	CORE	S-S	S-S	C-S
	PARTICIPANT	ARGUMENT	MODIFIER	PRESENT
<i>overt subject</i>	yes	yes	no	yes
<i>pro-dropped subject</i>	yes	yes	no	no
<i>overt entailed adjunct</i>	yes	no	yes	yes
<i>silent entailed adjunct</i>	yes	no	no	no
<i>overt non-entailed adjunct</i>	no	no	yes	yes
<i>silent non-entailed adjunct</i>	no	no	no	no

Table 1: Representation of overt and covert arguments and adjuncts

linguistic arguments. However, it would be surprising on a view where there is necessarily a one-to-one mapping between entailed participants and linguistic arguments.

2.7 Interim summary and comments

Thinking about events that verbs refer to involves conceptualizing what and who needs to be present in order for the event (or state) to be possible. These necessary participants often align exactly with the linguistic arguments of the verb. However, there can also be mismatches between entailed event participants and linguistic arguments, and several such mismatches have been reviewed in this section. Mismatches between core conceptual event participants and linguistic (grammatical) arguments illustrate that our linguistic knowledge, our grammar, does not directly reflect our cognitive construal of the world. This point is supported by recent experimental evidence: Ünal et al. (2024) investigate agents, patients, goals and instruments in linguistic and non-linguistic cognitive tasks. They conclude that even though linguistic participants largely mirror conceptual event participants, the mapping is not strict.

There is of course also a distinction between our conceptual construal of events and actual events that take place in the world (Levin & Rappaport Hovav 2005: pp. 19–20, and others). Our idealized conceptualization of an event that reflects the meaning of the verb *buy* can be quite different from an actual buying event. In an actual buying event, it might be difficult to pinpoint who the buyer and seller are. There might be deception involved. The event may involve a third party who sets up a complicated payment plan. The buyer and seller may carry different beliefs about what is being bought. Any given buying event might in fact include crucial and necessary factors that have little to do with the core meaning of the verb. There might be crucial reasons for the purchase, the purchase might happen by mistake, and the intended recipient might be different from the buyer. Actual events that take place in the world are often messy.

In short, verbs are associated with argument structures in our grammars. Our conceptualization of events includes entailed event participants. Actual events that take place in the world involve concrete and abstract entities like people, things, time spans, motives, etc. Even though it is possible to think about (and model) systematic mappings between linguistic arguments, conceptualized event participants, and actual participants in real events, the mappings are not always direct or one-to-one. There are mismatches between language, our cognitive construal of the world, and events that actually take place in the world.

3 Animacy

This section continues to explore mismatches between grammar, cognitive construal, and the world, but the empirical focus is redirected from argumenthood to the concept of *animacy*.

Many languages include ANIMACY as a grammatical feature, comparable to other grammatical features such as NUMBER or TENSE. As such, animacy is part of speakers' formal, unconscious knowledge of language, where it plays a mechanical role. If sentences are manipulated in ways that involve the grammatical/morphological markers sensitive to animacy, speakers will be able to provide judgements

about which strings are grammatical and which ones are not, but they might not be able to tell you exactly why.

The Inari Saami verbal agreement system provides an example of a grammatical pattern where animacy plays a role. Verbs in Inari Saami agree with the subject in three persons and three numbers: singular, dual and plural (Toivonen 2007, Morottaja & Olthuis 2022: ch. 2.2). However, when the subject is inanimate, the verb only inflects for two numbers, singular and plural. When the subject refers to two inanimate entities, the verb is plural, not dual (see Toivonen 2007 for details). This contrast between animates and inanimates is illustrated in (19)–(20):

- (19) Kyeh'ti almaa láin meecist.
two man be.PST.3DU forest.LOC
'Two men were in the forest.'
- (20) Kyeh'ti stuorra keeđgi láá meecist.
two big rock be.PRES.3PL forest.LOC
'Two big rocks are in the forest.'

The animate subject in (19) triggers dual agreement on the verb, but the inanimate subject in (20) does not. Both subjects refer to two entities.

It is worth noting here the grammatical animacy effects comparable to what is observed in Inari Saami are very common cross-linguistically. A few other examples of grammatical animacy are provided in sections 3.1–3.2 below, and further examples include agreement marking in Turkish (Bamyacı et al. 2014), number marking on nouns in Tamil (Baskar & Toivonen 2025), ergative/dative case marking (Butt 2006), and the case marking of objects in Spanish (Fábregas 2013: a.o.), Romanian (Barbu & Toivonen 2018), and Hindi/Urdu (Butt 1993).

What exactly does animacy actually mean? What ontological characteristics determine whether or not an entity is animate? A foundational difference between animate and inanimate entities is that animates are *alive* and inanimates are not. However, it turns out not to be all that easy to determine exactly what it means to be alive, to have life. This is a point of debate within and across the fields of biology, chemistry and philosophy (Fantini et al. 2024, Nurse 2020: and others). One recent characterization of life is provided by Gómez Márquez (2021):

- (21) “In my opinion, living organisms share seven traits: organic nature, high degree of organization, pre-programming, interaction (or collaboration), adaptation, reproduction and evolution, the last two being facultative as they are not present in all living beings.” (Gómez Márquez 2021)

Based on this definition, Gómez Márquez concludes that viruses are alive, although this conclusion is controversial even among biologists. In grammatical animacy, viruses typically group with inanimates.

Grammatical animacy is not unrelated to biological life and the two concepts often align. However, there are also many mismatches; viruses were mentioned above, but also spores and cells. Plants constitute what is perhaps a more obvious example: plants are clearly biologically living creatures, but they are only rarely classified as animates grammatically. For example, plants pattern grammatically with inanimates in Inari Saami.

A key difference between biological and grammatical animacy is that the biological distinction between alive and not alive is universal in the sense that whatever the distinction is, it will hold everywhere. By contrast, the details regarding where to draw the line between grammatically animate and inanimate is not universal, and languages differ in their animacy classification. Languages differ with respect to many details regarding animacy, but at a general level, they differ in terms of where on the *animacy hierarchy* (22) the dividing line is drawn:⁸

⁸Many formulations of the animacy hierarchy are less or more detailed. See Silverstein (1976) for an early presentation of the animacy hierarchy, and for more detail and further references, see, e.g., Yamamoto (1999: ch. 1).

(22) HUMAN > HIGHER ANIMALS > LOWER ANIMALS > PLANTS > THINGS

Many grammars group humans and animals together as one group (“animate”) and plants and inanimate objects as a different group (“inanimates”). Other grammars draw the dividing line between humans and all other entities. These are the two most common broad splits that are found cross-linguistically; see Yamamoto (1999) and Santazilia (2023) for many examples and extensive discussion.

It is clear from the hierarchy in (22) that alive/not alive cannot possibly be the only trait that is relevant for animacy distinctions. A number of other properties have been argued to be relevant as well (Yamamoto 1999, Becker 2014, Jozwik et al. 2022: a.o.). A list of the main animacy properties are provided in Table 2 below:

<i>life</i>	organic nature, reproduction, etc. (see (21) above)
<i>agency</i>	the ability to deliberately perform actions
<i>perception</i>	the ability to perceive (see, taste, etc.)
<i>sentience</i>	the ability to sense pain, pressure, etc.
<i>emotions</i>	the ability to feel joy, sadness, etc.
<i>language</i>	the ability to understand and produce language
<i>intelligence</i>	the ability to solve problems, reason, use creativity
<i>self-propelled motion</i>	the ability to instigate and maintain self-motion
<i>sound</i>	the emission of animate sound
<i>shape</i>	the appearance of animate shape
<i>face</i>	the appearance of facial features

Table 2: Animacy properties

Multiple studies in psychology and neuroscience have shown that humans show sensitivity to several of the properties in Table 2, often from a very young age (for examples of recent work see Hofrichter et al. 2021, Torabian & Grossman 2023, Félix et al. 2024). It is not clear which ones of these properties are especially important for grammatical animacy. My guess is that attention to different properties might lead to different splits in the hierarchy. For example, a focus on language might lead to a split between humans and others, while a focus on self-propelled motion might lead to a split between animates (humans and animals) and inanimates (plants and things).

Note that a speaker cannot definitively know whether other entities in the world actually have the characteristics in Table 2. It is, for instance, notoriously difficult to know whether others are *sentient* (Harnad 2016, Candiotti 2025). Many questions about sentience in organisms other than humans remain unanswered even among experts. For example, there is an on-going debate regarding whether and how insects (Gibbons et al. 2022) and even plants (Calvo et al. 2017, Nick 2021) are sentient and feel pain.

Since experts in the relevant scientific fields cannot conclusively determine which entities or species possess the kinds of characteristics listed in Table 2, naïve speakers cannot know either. Does a turtle have true agency or does it simply act on instinct? Do bunnies feel longing? Does a sunflower’s tracking of the sun count as self-propelled motion? Speakers do not have direct access to factual answers to such questions, yet they are able to effortlessly and automatically classify entities into animacy groups. This classification does not depend directly on actual facts about the world, but rather on speakers’ *conceptualization* of entities in the world. The animacy classification of entities is thus only indirectly based on actual properties of those entities. What is encoded is instead the speakers’ conceptualization of those entities and speakers’ general construal of the world.

I will adopt the assumption that a noun can be inherently specified for grammatical animacy, and that specification may contradict both the conceptual animacy and biological animacy of the referent of that noun (some mismatched examples are provided in section 3.1). However, nouns are typically specified for grammatical animacy features according to how their referents are conceptualized in relation to one or more of the properties in Table 2. The speaker does not need to hear new nouns in a grammatical context in order to learn their animacy characteristics (unlike grammatical gender on inanimate nouns).

If an entity is conceptualized as animate, the noun referring to that entity will carry (or trigger) animate morphology. In the discussion below, grammatical animacy will be formalized with features, so one way to think about it is that the speaker assigns a feature such as [ANIMATE +] to the relevant noun according to the perceived animacy of the referent. This can be done online if the speaker encounters a novel referent described by a novel noun. In other words, I assume that a speaker can instantly evaluate the animacy of a previously unfamiliar entity, and this determines the corresponding noun's grammatical animacy, unless contradictory information is provided through morphology. This can be compared to how speakers may determine the gender of a person (or animal) based on some conceptualization about the referent's biological sex.

Although very little hinges on it here, I further adopt the assumption that grammatical animacy is binary. Even though the cut-off point in the hierarchy occurs in different places in different languages (and sometimes in different grammatical phenomena in the same language, Baskar & Toivonen 2025), the distinction is always binary. Conceptual animacy, however, is more fuzzy and gradient. This categorical/gradient difference between grammatical and conceptual animacy is argued for at length by de Hoop & de Swart (2018).

The remainder of this section considers linguistic data sets that reflect animacy in different ways. Section 3.1 considers the role of animacy in Persian agreement marking on verbs and plural marking on nouns. Section 3.2 discusses the cross-linguistic tendency for subjects to be higher in animacy than objects. Section 3.3 presents newly collected data on the influence of animacy on judgements about the English pronouns *she* and *it*. Finally, section 3.4 offers a brief summary of the main points.

3.1 Persian agreement and number marking

In Standard Persian (Farsi), verbs generally agree in number with *animate* plural subjects but not with *inanimate* plural subjects. This is illustrated in examples (23)–(24), adapted from Lotfi (2006: p. 126):

- (23) mard-ha umad-an xune.
man-PL come-PAST.PL home
'The men came home.'
- (24) ketab-ha bad forush raft.
book-PL bad sale go.PAST.SG
'The books sold badly.'

Several Persian grammars (Rosen 1898: p. 65, Mahootian 1997: p. 65) note that the verb can sometimes agree even with inanimate subjects. In fact, it seems that agreement with inanimate plural subjects is quite common in modern Persian. The optionality has been investigated by Lotfi (2006), Sedighi (2006), Hashabeiky (2007), and Feizmohammadpour (2013), and is illustrated in (25)–(26), adapted from Sedighi (2006):

- (25) toofan-ha-ye peyapey dehkæde ra viran kærd.
storm-PL-of constant village ACC destroyed did.3SG
'Constant storms destroyed the village.'
- (26) toofan-ha-ye peyapey dehkæde ra viran kærd-and.
storm-PL-of constant village ACC destroyed did-3PL
'Constant storms destroyed the village.'

Lotfi (2006) shows that plural agreement signals "a distributive conceptualization where the entities are individuated". The generalization is thus that plural agreement signals that the subject is plural and animate *or* distributive/individuated. The generalizations are captured by adopting the agreement features in (27) for singular verbs and (28) for plural verbs:

- (27) $\emptyset: (\uparrow \text{SUBJ PERS}) = 3$

- (28) *-an(d)*: (↑ SUBJ PERS) = 3
 (↑ SUBJ NUM) = PL
 { (↑ SUBJ ANIMATE) = + | (↑ SUBJ DISTRIBUTIVE) = + }

The agreement specification characterized in (27) is “unmarked” phonologically and only marked for PERSON syntactically. It is not associated with any specific phonological form, and it is not specified for number. Even though it is regularly glossed as singular, it is compatible with both singular and plural subjects.

The suffix *-an(d)* in (28) is only compatible with plural subjects. The specification { (↑ SUBJ ANIMATE) = + | (↑ SUBJ DISTRIBUTIVE) = + } ensures that the subject must be animate or distributive or both (the disjunction is inclusive). I am assuming some version of morphological blocking, whereby (28) must be used if it can be used, and (27) is the elsewhere case.

Sample lexical entries for verbs bearing these agreement features are given in (29)–(30):

- (29) *umad*: (↑ PRED) = ‘arrive’
 (↑ TENSE) = PAST
 (↑ SUBJ PERS) = 3
- (30) *umadan*: (↑ PRED) = ‘arrive’
 (↑ TENSE) = PAST
 (↑ SUBJ PERS) = 3
 (↑ SUBJ NUM) = PL
 { (↑ SUBJ ANIMATE) = + | (↑ SUBJ DISTRIBUTIVE) = + }

Recall that nouns get assigned the grammatical feature [ANIMATE +] or [ANIMATE –] depending on whether the referent is conceptualized as animate or not. The possibility of *personification*, where inanimate entities are talked about as if they are animate, indicates that animacy can be processed online in real time, which is reflected in grammatical animacy: personified biologically inanimate subjects take plural agreement in modern Persian, but also in the classical language, where plural agreement with inanimates was more unusual (Feizmohammadpour 2013, Hashabeiky 2007, Lotfi 2006). This is illustrated by the example in (31), from the 13th century poet Jalal al-Din Muhammad Rumi’s *Fih-e Ma Fih*:⁹

- (31) Sefat-e to ashegh-e hagh-and.
 attributes-of you lover-of truth.be.PRES-PL
 ‘Your attributes are lovers of the truth.’

Personified subjects are conceptualized as if they are animate, and this is reflected in the grammar, as evidenced by the plural agreement triggered by personified subjects.

The examples above are concerned with morphological marking on verbs. Animacy is also relevant for nominal morphology in Persian. Nouns that refer to more than one individual/thing often carry plural morphology. The most common plural morpheme on nouns is *-(h)a*. However, there is also another, more formal, plural morpheme *-an*. As a general rule, *-an* can occur on animate nouns, but not inanimate nouns. For example, there are two plural forms for ‘man’, *mard-ha* and *mard-an*, but there is only one plural form for ‘pain’, *dard-ha*. The form **dard-an* is not acceptable. There are some arbitrary exceptions to this animacy-governed rule, and a few inanimate nouns can take the *-an* ending. The exceptions include *derakhtan* ‘trees’, *fereštegan* ‘angels’, *setaregan* ‘stars’, and *nilufəran* ‘water lilies’ (Hamedani 2011: pp. 19–20).

I propose that *-an* has a grammatical [ANIMATE +] feature, which allows it to combine with animate nouns. Exceptions such as *derakhtan* are listed fully inflected in the lexicon and can be used alongside the productively composed regular forms, which are less formal. The Persian lexicon contains the following forms:

⁹The glosses and translations in (31) are from Lotfi (2006), who also provides other personification examples.

- (32)
- | | | | |
|----------------|-------------------|------------------|-------------------|
| <i>-ha</i> | (↑ NUM) = PL | <i>-an</i> | (↑ NUM) = PL |
| | | | (↑ FORMAL) = + |
| | | | (↑ ANIMATE) = + |
| <i>derakht</i> | (↑ PRED) = 'tree' | <i>derakhtan</i> | (↑ PRED) = 'tree' |
| | ((↑ NUM) = SG) | | (↑ NUM) = PL |
| | | | (↑ FORMAL) = + |
| | | | (↑ ANIMATE) = + |

There are thus two plural forms for ‘tree’ in Persian: the lexically stored *derakhtan* and the productively composed *derakhtha*. The *derakhtan* form is specified as [ANIMATE +] because of the inherent animacy specification on *-an*. The *derakhtha* form is [ANIMATE –], because trees (and other plants) are conceptualized as belonging to the inanimate group in Persian. This analysis also extends to the other inanimate forms that exceptionally take the *-an* plural ending (e.g., *setaregan/setareha* ‘stars’). The analysis of exceptional *-an* forms as conceptually inanimate but grammatically animate can be compared to number in so-called *plurale tantum* words. These are words with plural morphology and (at least in some uses) singular reference: *scissors, news, heroics, outskirts*, etc.

A plural subject inflected with *-an* is grammatically animate, and it therefore obligatorily triggers plural agreement on the verb. This is illustrated in (33):¹⁰

- (33) a. derakht-an oftad-and
tree-PL fall.PAST-3PL
'The trees fell.'
b. *derakht-an oftad
tree-PL fall.PAST.3SG

Plural *-ha* is not prespecified for animacy; *derakht-ha* gets its animacy specification from the conceptual analysis of ‘tree’ as inanimate. Recall that sentences with inanimate subjects are generally compatible with both singular or plural agreement marking. This pattern predictably occurs when the subject is *derakhtha*:

- (34) a. derakht-ha oftad-and
tree-PL fall.PAST-3PL
'The trees fell.'
b. derakht-ha oftad
tree-PL fall.PAST.3SG
'The trees fell.'

The subject *derakhtha* patterns with inanimates: it is compatible with singular agreement (34b). This indicates that it is not generally the case that trees are considered animate in Persian. The form *derakht-an* is a memorized exception.

The examples in this section have illustrated the interplay between conceptual and grammatical animacy in Persian. The analysis has a consequence that may seem surprising. Some words referring to inanimates exceptionally allow the plural ending *-an* which is inherently grammatically animate. A few of the words that exceptionally allow *-an* refer to plants (*derakht*, but also *nilufær* ‘water lily’ and some others), and these words can therefore pattern with animates grammatically (when they combine with *-an*). Trees (and water lilies, etc.) are biologically animate (that is, their real-world referents are animate), at least by the ‘alive’ definition (but see Table 2). On the present analysis, *derakhtan* and *nilufæran* are grammatically and biologically animate, but conceptually inanimate.

¹⁰I am grateful to Fatemeh Maleki for help with examples (33)–(34).

Animacy	Subject Manipulation	Object Manipulation
HUMAN	The teacher felt happy.	The changes confused the uncle.
HIGHER ANIMAL	The dog felt happy.	The changes confused the moose.
LOWER ANIMAL	The spider felt happy.	The changes confused the fly.
PLANT	The maple tree felt happy.	The changes confused the pine tree.
THING	The pen felt happy.	The changes confused the stick.

Table 3: Sample Items from Agyemang et al. (2024)

3.2 Animacy and grammatical functions

Consider the examples in (35)–(36):

(35) That accountant danced the night away.

(36) #That brick danced the night away.

Example (35) sounds completely natural, but (36) does not. This is not a grammatical effect; both sentences are perfectly grammatical in English. Sentence (36) sounds odd because of what we know about bricks: a brick is an inanimate object that does not and cannot dance. The contrast between (35) and (36) is due to our knowledge and conceptualization of the world, not grammar.

As is characteristic for conceptual animacy, judgements about what sorts of participants are appropriate subjects or objects of specific predicates are gradient, not categorical. In fact, in cases where a verb ideally takes a human argument, the judgements follow the cline of the animacy hierarchy quite neatly. Agyemang et al. (2024) elicited judgements about sentences with predicates whose prototypical subjects or objects have human referents. The stimulus sentences included subjects and objects with referents that spanned the animacy hierarchy: humans, higher animals, lower animals, plants and inanimate objects. Table 3 contains two of the stimulus sets as examples.¹¹

The stimuli were divided over two surveys so that the same participants would not see too many near-identical sentences. 148 native speakers of English were included in the analysis. The naturalness ratings followed the cline of the animacy hierarchy: The median ratings for the stimuli were 7 for humans, 5 for higher animals, 4 for lower animals, 2 for plants, and 1 for inanimate things. This is not a grammatical effect. The effect instead reflects the participants' conceptualization of events and event participants. When the ideal participant is a human agent or experiencer, the naturalness of the interpretation decreases as the level of animacy of the participant decreases.

Agyemang et al.'s study illustrates the conceptualization of participants and their animacy in individual events. The animacy of participants is also reflected in grammatical tendencies. Agents are animate and commonly subjects (Jackendoff 1972: p. 32). Humans are ideal agents, so it follows that subjects are often human. Themes and patients, on the other hand, are commonly inanimate and expressed as direct objects. As a result, grammatical subjects are often higher in animacy than objects. These trends have been commonly noted in the literature (e.g., Silverstein 1976, King 1995, J. Aissen 1997, 1999), and the prevalence of animate subject and inanimate objects is demonstrated directly in corpora of Swedish (Dahl & Fraurud 1996, Dahl 2000, 2008), Norwegian (Øvrelid 2004), Dutch (Bouma 2008), Tondano (Brickell & Schnell 2017), as well as in the Multi-CAST cross-linguistic corpus (Haig et al. 2021). These trends follow at least partially from the extra-linguistic tendency to conceptualize events as animate agents acting on inanimate patients (see, e.g., Brocard et al. 2024). In the languages listed above, this is a

¹¹The study additionally contained the following two sets of stimuli:

- (i) *The {passenger/horse/bear/bee/rose/rock} planned the next step.*
- (ii) *The events embarrassed the {violinist/bear/moth/dandelion/road}.*

The exact instructions were: *Please rate each sentence according to how natural it sounds. Rank the sentences on a scale from 1 to 7, where 1 means "This does not sound like a natural sentence" and 7 means "This sounds like a completely natural sentence." There are no correct or incorrect answers, we are simply interested in your intuitions.*

statistical tendency and not a grammatical rule. Examples such as (37) are perfectly grammatical, just not very common:

(37) The disease destroyed the entire herd of pigs on the farm.

The statistical tendency that favors animate agents is grammaticalized in some languages, as pointed out by Dahl (2008) and others. Navajo (Athabaskan) requires the subject to be at least as animate as the object (Hale 1973), and Mam (Mayan) does too (Minkoff 2000). Blackfoot (Algonquian), Halkomelem (Salishan), and several Mayan languages (e.g., Jakaltek) disallow inanimate subjects in transitive clauses (Craig 1977, J. L. Aissen 2003, Deal & Royer 2025). The Blackfoot example in (38) violates the animacy expectation and is therefore ungrammatical (Frantz 2017: p. 49):

(38) *Oma istoána ikahksínima annistsi ikkstsíksiistsi.
that knife cut those branches
'That knife cut off those branches.'

Frantz (2017: p. 48) notes that "[i]n general, the subject of a transitive verb in Blackfoot is presupposed to be capable of exercising will." Inanimates are not capable of exercising will, which explains why (38) (with the inanimate subject *knife*) is not acceptable. Blackfoot is thus an example of a language that has grammaticalized the statistical preference for animate subjects.

The animacy preferences in grammatical functions interact in interesting ways with word order preferences, and can perhaps ultimately form part of the explanation for why word orders where subjects (which are often agents) precedes objects (which are often patients) are by far the most common in the world's languages (see, e.g., Tomlin 1986, Primus 1999). In their discussion of a production and eye tracking study of Murrinpatha, Nordlinger et al. (2022: p. 212) make the following suggestion:

"Encoding agents early in sentence production is crucial, since lower arguments are defined with respect to their relationship to the agent; thus this effect suggests that agent prominence may represent a universal property of event conceptualization and could explain why, in free word order languages like Murrinpatha, speakers produce proportionally more A-initial sentences."

In other words, the agent-first preference can shine through even when this preference is not dictated by the grammar. This point is also made by Riesberg et al. (2019), who base their discussion on Austronesian symmetrical voice languages.

Languages differ in how they grammaticalize constraints on grammatical functions (e.g., must the subject be animate?) and also the linguistic expression of grammatical functions (e.g., word order, agreement marking). These constraints and expressions vary drastically cross-linguistically, but certain trends can be clearly observed. For example, subjects tend to precede objects, subjects tend to be higher in animacy than objects, and animate objects are more likely to receive special morphological marking than inanimate objects. At least some of these trends can be explained by how speakers conceptualize events and event participants. In order to understand these phenomena, it is important to separate speakers' knowledge of grammar from their cognitive construal of the world which influences how they process and use language.

3.3 English pronouns

Multiple studies have detected small but noticeable animacy effects in different corners of the English grammar. For example, Rosenbach (2008) and others have shown in studies on genitive formation that animates are preferred in the Saxon genitive ('s) and inanimates are preferred in *of*-genitives, but several other factors are also relevant for the choice of genitive form. Animacy has similarly been identified as one of several factors that influence relative clause formation, auxiliary contraction, and copula contraction

HUMAN	I noticed a teacher . She was tall. I noticed a teacher . It was tall.
ANIMAL	This horse smells strange because she is covered in mud.
HIGH	This horse smells strange because it is covered in mud.
ANIMAL	The caterpillar was wet. She must have been out in the rain.
LOW	The caterpillar was wet. It must have been out in the rain.
PLANT	The pine tree was old. She was older than the others. The pine tree was old. It was older than the others.
INANIMATE	The cake is on the counter. She is fresh out of the oven. The cake is on the counter. It is fresh out of the oven.

Table 4: The *it/she* pronoun study: Sample stimulus items

and deletion (McLaughlin 2014). However, compared to languages such as Persian, Mam, and Inari Saami, English does not incorporate animacy as a prominent factor in its grammar.

The most obvious grammatical animacy effect in English grammar is found in the pronominal system. Third person singular personal pronouns make a distinction between the animate (mainly human) forms *he/she* and the inanimate form *it*. Similarly, the interrogative pronoun *who* is animate (human) and *what* is inanimate.

The remainder of this section is devoted to a questionnaire study that investigated the effect of animacy on third person singular pronoun choice in English.¹² For the sake of simplicity, only two pronouns were included, *it* and *she*. We did not test *he* or the gender-neutral *they*. The pronoun *she* is used for female humans and also for some female animals. At least some speakers can also use *she* as an alternative to *he* and *they* to refer to a human of unspecified gender (*anyone has the right to leave whenever she wants*). The pronoun *she* is only very occasionally used for things (e.g., ships) in standard dialects, although there is dialectal variation in whether *he* and *she* can be used for inanimates (Pawley 2002, Wagner 2005). The pronoun *it* is used for things, plants, and animals. When an animal is specified as female, either *she* or *it* can be used. The use of *it* for humans is rare, and would typically be intended and interpreted as an insult.¹³

In the questionnaire study, participants were asked to provide naturalness judgements on passages such as the ones in Table 4. The study included 40 stimulus items: 4 items per animacy level (5 levels)¹⁴ and one version of each stimulus item per pronoun (*she* or *it*). The stimuli were divided into two separate surveys so that no participant would see both members of a minimal pair. As a consequence of this design, each participant saw 60 items (20 stimulus items and 40 fillers). 474 participants were recruited through the SONA system of Carleton University's Cognitive Science Department. Participants that did not complete the survey or were not self-reported native speakers of English were excluded. The analysis presented here includes the responses of the remaining 310 participants. The participants were asked to rate how natural the stimuli sounded on a scale from 1 to 7, where 1 was 'completely unnatural' and 7 was 'completely natural'.

Based on the description of possible referents for *it* and *she* provided above, the ratings of the two pronouns were predicted to be inverted images of each other. The pronoun *it* was expected to sound unproblematic with animals, plants and things, but odd with human referents. The pronoun *she* was expected to be natural with humans (and possibly higher animals), but odd with lower animals and, especially,

¹²The data were collected with the help of Sebastien Lylyk, and ethics approval was granted by the Carleton University Research Ethics Board.

¹³This description of *she* and *it* is based on conversation with native speakers of English (mostly Canadian English) and a consultation of the Merriam-Webster Dictionary (Merriam-Webster 2025). One speaker that was consulted reported that *it* is currently explored as an alternative to gender-neutral *they*, but this use is not (yet) common.

¹⁴In addition to what is shown in Table 4, the target nouns included in the study were *student*, *singer*, *server*, *dog*, *cat*, *cow*, *frog*, *worm*, *wasp*, *rose bush*, *orchid*, *tulip*, *mailbox*, *table*, and *ladder*.

	<u>she</u>		<u>it</u>	
	M (SD)	Median	M (SD)	Median
HUMAN	5.22 (1.67)	6	2.12 (1.42)	2
HIGHER ANIMAL	4.73 (1.82)	5	4.93 (1.80)	5
LOWER ANIMAL	3.81 (1.91)	4	4.99 (1.86)	5
PLANT	3.41 (1.76)	3	5.63 (1.55)	6
THING	2.68 (1.66)	2	5.67 (1.57)	6

Table 5: Ratings in the *it/she* pronoun study

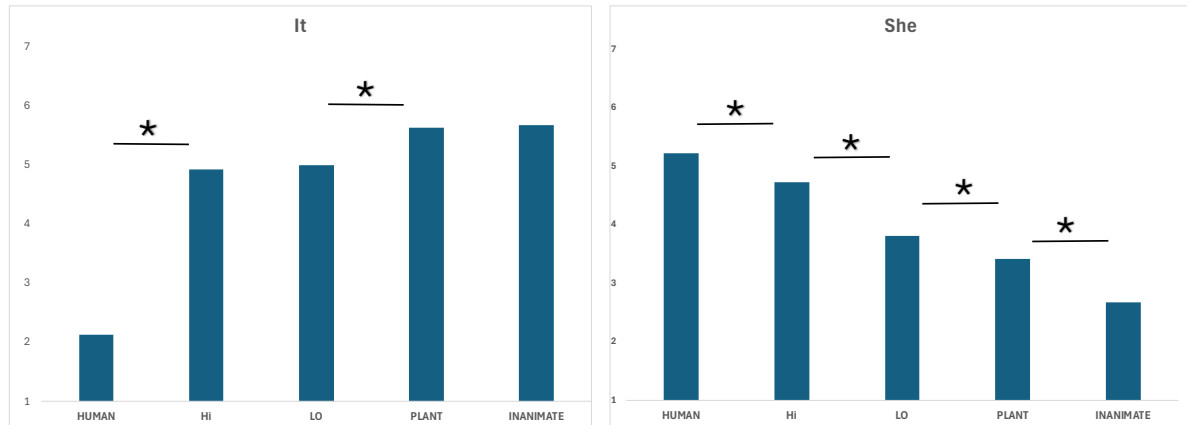


Figure 1: The *it/she* pronoun study: Mean ratings

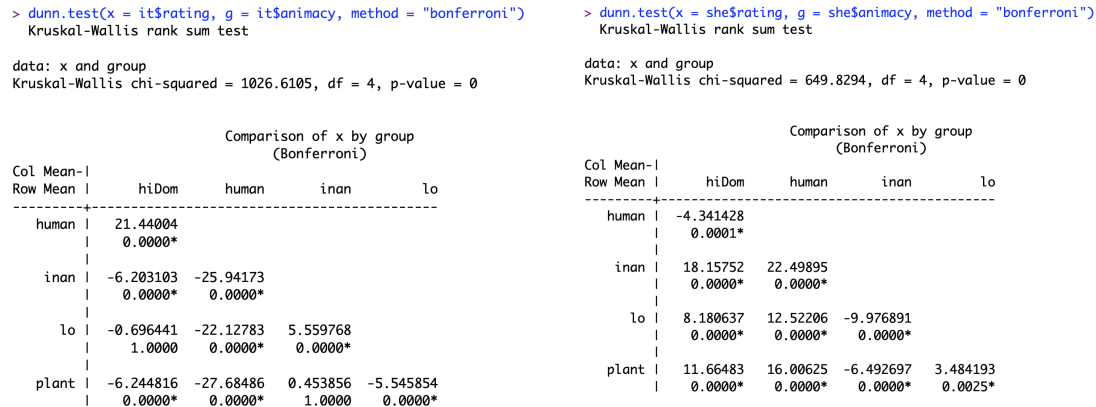


Figure 2: The *it/she* pronoun study: Dunn's tests for *it* (left) and *she* (right)

plants and things. The prediction was straightforward, except it was difficult to know how participants would react to *she* with (higher) animals.

A visual representation of the results is provided in Figure 1, and the mean and median ratings are presented in Table 5. Both means and medians are informative: the means are the basis for Figure 1 and they offer some nuanced detail. However, the medians straightforwardly show the main patterns in the data.

Separate Kruskal-Wallis tests were performed for *she* and *it*. Both tests indicated significant differences across the groups (*she*: $\chi^2 = 649$, $p < .001$; *it*: $\chi^2 = 1026$, $p < .001$). Dunn's tests were then used to allow for pair-wise comparisons. The analyses are shown in Figure 2.

The *it* ratings conform to the predictions. The participants gave low ratings to sentences where *it* referred to humans. All other animacy categories were judged to be good referents for *it*. Animals were rated quite highly, but received lower ratings than plants and inanimate objects. The explanation for this might be that some speakers seem to feel uncomfortable referring to animals with *it*.¹⁵ It is possible that some speakers have grammaticalized *it* as incompatible with animates in general, not just humans.

The *she* rating pattern is not an inverted image of the *it* pattern, contrary to predictions. Instead, the *she* ratings seem to follow the animacy hierarchy quite perfectly. The pronoun *she* is most compatible with nouns that refer to humans, followed by higher animals, then lower animals, then plants, and finally inanimate things, which are least compatible with *she*.

The difference between *she* and *it* ratings can be explained with personification, which was argued in section 3.1 to be governed by the cognitive construal of animacy rather than grammatical animacy. The pronoun *it* is grammatically specified as [HUMAN –]. This grammatical specification is only very rarely violated in language use, but it might occur for example in insults. The pronoun *she* is grammatically specified as [HUMAN +]. However, personification allows *she* to refer back to entities that are not biologically human. Speakers readily construe animals, and even plants and things, as having characteristics that stereotypically belong to humans: agentivity, emotions, etc. Using the human pronoun *she* to refer to non-humans gives a reason to conceptualize the referent as having these human characteristics. This conceptualization gets gradually harder as we descend down the animacy hierarchy, as the *she* results of this study illustrate.

In sum, I propose that the contrast between the *it* and *she* results can be explained by the fact that the grammatical specifications are directly reflected in the *it* ratings, but when the pronoun is *she*, the grammar can to a certain extent be overridden by personification (the cognitive construal of non-human referents as human or humanlike). This offers a straightforward explanation of the main patterns in the data, and it is compatible with de Hoop & de Swart's (2018) claim that grammatical animacy distinctions are binary¹⁶ and conceptual animacy distinctions are more gradient.

3.4 Summary

Animacy is reflected in language. However, it is not exactly clear what 'animacy' is. We cannot directly judge the existence or degree of animacy in others. We do not have a good understanding of which creatures in the world share properties in common with us. We do not know how or whether other animals experience feelings, make decisions, reason, or sense pain. Therefore, linguistic reflexes of animacy cannot directly reflect actual biological animacy as it manifests in entities in the world. Our construal of animacy can be detected as gradual trends and tendencies in our speech. These tendencies can be grammaticalized as categorical effects such as strict assignment of grammatical functions, pronoun choice and morphology.

Grammatical animacy thus does not *directly* reflect the actual properties of other humans, animals and things in the world. Our knowledge about the world around us is filtered by our perception and cognitive construal of it. Bayanati & Toivonen (2019) and Trompenaars et al. (2021) have previously pointed out that the three-way distinction between grammar, cognition, and biology is important for understanding animacy, and the difference between grammatical animacy and conceptual animacy has previously been discussed by Frawley (1992), Ormazabal & Romero (2007), McLaughlin (2014), and de Hoop & de Swart (2018). This section has added to that literature.

¹⁵This claim is based solely on informal discussions with English speakers, in particular young speakers of Canadian English.

¹⁶It looks like the *it* ratings reflect a ternary distinction, but this might be because some speakers have grammaticalized *it* as [HUMAN –], not [ANIMATE –]. If this is the case, then this would explain why animals are rated slightly lower. The grammatical distinctions are still binary, but different participants have grammaticalized different cutoff points on the animacy hierarchy for *it*. This study was not designed to investigate this question, so it must remain a speculation at this point.

4 Concluding remarks

This paper has been concerned with the mapping between linguistic arguments and conceptual event participants (section 2) and also the nature of the concept ‘animacy’ and its role in language (section 3). I have tried to argue that details and generalizations emerging from the data sets can be naturally understood and analyzed if we recognize the following:

- (39) a. Not all linguistic patterns are governed by the grammar.
- b. There is a distinction between grammar and our cognitive construal of the world.
- c. We don’t have access to direct facts about the world. We interpret and talk about real entities and events through the lens of our perception and construal of those entities and events.

This paper has focused on two topics: arguments/core participants and animacy. However, the points in (39) are relevant for other topics as well. The lack of direct mappings between grammar and extralinguistic phenomena has been stressed before, notably by Otto Jespersen (e.g., Jespersen 1924), and also others (e.g., Gehrke 2022, Corbett 2022, Carson 2018, Nenonen & Niemi 2010). TENSE marking has something to do with time. However, the mapping between time and tense is by no means predictable or direct. If it were, all grammatical tense systems would presumably look alike, and they do not. Furthermore, we only have access to time through our conceptualization of it. Grammatical EVIDENTIALITY markers denote *sources of information*, and choices of what evidentiality marking to use in different contexts is in part dictated by *reliability*. However, different languages divide their system of evidentiality marking in different ways, which indicates that evidentiality systems are not directly dictated by real-world classes of information. Also, how evidentiality is marked and what information is deemed reliable has more to do with our conceptualization of information rather than the information itself. Grammatical NUMBER is related to quantity, but not directly, and there are cross-linguistic differences with respect to how many numbers (SG, DU, ETC.) are grammatically marked, whether number is marked on all or only some nouns, etc. Grammatical GENDER is only loosely related to biological sex, which in turn is only loosely related to gender as a construct. Grammatical ASPECT is connected to the distinction between completed and on-going action, but the details are complicated. I suggest that some complications in these research areas will disappear if we keep in mind the tripartite distinction between grammar, cognition and the world.

Acknowledgments

I am very grateful to Katie Van Luven, Levi Frauzel, Mary Dalrymple, Raj Singh and two anonymous reviewers for their thoughtful questions and comments. I am also thankful to Cathy Agyemang, Hesam Farahani and Sebastien Lylyk for discussion of animacy, and for letting me include data that we collected together in two different projects. Finally, thank you, Miriam and Tracy, for the massive amounts of insights you have produced over the years!

References

- Agyemang, Cathy, Hesam Farahani & Ida Toivonen. 2024. The animacy of subjects and objects in English. Manuscript, Carleton University.
- Aissen, Judith. 1997. On the syntax of obviation. *Language* 73. 705–750. <https://doi.org/10.1353/lan.1997.0042>.
- Aissen, Judith. 1999. Markedness and subject choice in optimality theory. *Natural Language & Linguistic Theory* 17(4). 673–711. <https://doi.org/10.1023/A:1006335629372>.
- Aissen, Judith L. 2003. Differential object marking: Iconicity vs. economy. *Natural Language & Linguistic Theory* 21. 435–483. <https://doi.org/10.1023/A:1024109008573>.
- Apresjan, Yuri D. 1992. *Lexical semantics: User’s guide to contemporary Russian vocabulary*. Ann Arbor: Karoma Publishers.

- Arka, I Wayan. 2014. Locative-related roles and the argument-adjunct distinction in Balinese. *Linguistic Discovery* 12(2). 55–83. <https://doi.org/10.1349/ps1.1537-0852.a.446>.
- Bamyacı, Elif, Jana Häussler & Barış Kabak. 2014. The interaction of animacy and number agreement: An experimental investigation. *Lingua* 148. 254–277. <https://doi.org/10.1016/j.lingua.2014.06.005>.
- Barbu, Roxana-Maria. 2015. *Verbs and participants: Non-linguists' intuitions*. Carleton University MA thesis.
- Barbu, Roxana-Maria. 2020. *On the psycholinguistics of argumenthood*. Ottawa: Carleton University dissertation.
- Barbu, Roxana-Maria & Ida Toivonen. 2016a. Arguments and adjuncts at the syntax-semantics interface. In Ellen Thompson (ed.), *Proceedings of FLYM3*, 1–12. Miami, FL.
- Barbu, Roxana-Maria & Ida Toivonen. 2016b. Event participants and linguistic arguments. In A. Papafragou, D. Grodner, D. Mirman & J.C. Trueswell (eds.), *Proceedings of the 38th Annual Meeting of the Cognitive Science Society*, 1961–1966. Austin, TX: Cognitive Science Society.
- Barbu, Roxana-Maria & Ida Toivonen. 2018. Romanian object clitics: Grammaticalization, agreement and lexical splits. In Miriam Butt & Tracy Holloway King (eds.), *Proceedings of the LFG '18 conference*, 67–87. Stanford: CSLI Publications.
- Barrie, Michael. 2024. *Introduction to Generative Syntax: A Cross-Linguistic Approach*. <http://mikebarrie.com/teaching.html>.
- Baskar, Akshaya Kirithy & Ida Toivonen. 2025. Animacy effects in Tamil. In Miriam Butt, Jamie Y. Findlay & Ida Toivonen (eds.), *Proceedings of the LFG25 Conference*, 19–40. University of Konstanz: PubliKon. <https://doi.org/10.18148/lfg/2025.v30i.85>.
- Bayanati, Shiva & Ida Toivonen. 2019. Humans, animals, things and animacy. *Open Linguistics* 5. 156–170. <https://doi.org/10.1515/opli-2019-0010>.
- Becker, Misha. 2014. *The acquisition of syntactic structure: Animacy and thematic alignment*. Oxford: Clarendon Press. <https://doi.org/10.1017/CBO9781139022033>.
- Bosse, Solveig. 2014. A formal semantic approach to personal datives in Southern and Appalachian English. *Southern Journal of Linguistics*, 38(1). 95–116.
- Bouma, Gerlof. 2008. *Starting a sentence in Dutch: A corpus study of subject- and object-fronting*. Groningen: University of Groningen dissertation.
- Bresnan, Joan, Ash Asudeh, Ida Toivonen & Stephen Wechsler. 2016. *Lexical-Functional Syntax*. 2nd edn. (Blackwell Textbooks in Linguistics 16). Malden, MA: Wiley-Blackwell.
- Brickell, Timothy C. & Stefan Schnell. 2017. Do grammatical relations reflect information status? Reassessing Preferred Argument Structure theory against discourse data from Tondano. *Linguistic Typology* 21(1). 177–208. <https://doi.org/10.1515/lingty-2017-0005>.
- Brocard, Sarah, Vanessa A.D. Wilson, Chloé Berton, Klaus Zuberbühler & Balthasar Bickel. 2024. A universal preference for animate agents in hominids. *iScience* 27(6). <https://doi.org/10.1016/j.isci.2024.109996>.
- Brunetti, Lisa, Kordula De Kuthy & Arndt Riester. 2021. The information-structural status of adjuncts: A Question-Under-Discussion-based approach. *Discours* 28. 3–48. <https://doi.org/10.4000/discours.11454>.
- Butt, Miriam. 1993. Object specificity and agreement in Hindi/Urdu. In *Papers from the 29th regional meeting of the Chicago Linguistic Society*, vol. 1, 80–103.
- Butt, Miriam. 2006. *Theories of case*. Cambridge, UK: Cambridge University Press. <https://doi.org/10.1017/cbo9781139164696>.
- Butt, Miriam & Tracy Holloway King. 2015. Lexical-Functional Grammar. In Tibor Kiss & Artemis Alexiadou (eds.), *Syntax - theory and analysis: An international handbook*, vol. 2, 839–874. Berlin, München, Boston: De Gruyter Mouton. <https://doi.org/10.1515/9783110363708-002>.
- Calvo, Paco, Vaidurya Pratap Sahi & Anthony Trewavas. 2017. Are plants sentient? *Plant, Cell & Environment* 40(11). 2858–2869. <https://doi.org/10.1111/pce.13065>.

- Candiotto, Laura. 2025. The problem of sentience. *Phenomenology and the Cognitive Sciences* 24. 191–211. <https://doi.org/10.1007/s11097-024-09994-7>.
- Carson, Robyn. 2018. *Processing grammatical and notional number information in English and French*. Ottawa: University of Ottawa dissertation. <https://doi.org/10.20381/ruor-22562>.
- Conroy, Anastasia. 2007. The personal dative in Appalachian English as a reflexive pronoun. In Akira Omaki, Iván Ortega-Santos, Jon Sprouse & Matthew Wagers (eds.), *University of Maryland Working Papers in Linguistics*, 63–88. College Park, MD: University of Maryland.
- Corbett, Greville. 2022. The Agreement Hierarchy revisited: The typology of controllers. *Word Structure* 15(3). 181–225. <https://doi.org/10.3366/word.2022.0208>.
- Craig, Colette Grinevald. 1977. *The structure of Jacalteco*. Austin: University of Texas Press.
- Dahl, Östen. 2000. Egophoricity in discourse and syntax. *Functions of Language* 7(1). 33–77. <https://doi.org/10.1075/fo1.7.1.03dah>.
- Dahl, Östen. 2008. Animacy and egophoricity: Grammar, ontology and phylogeny. *Lingua* 118. 141–150. <https://doi.org/10.1016/j.lingua.2007.02.008>.
- Dahl, Östen & Kari Fraurud. 1996. Animacy in grammar and discourse. In Thorstein Fretheim & Jeanette K. Gundel (eds.), *Reference and referent accessibility*, 47–64. Amsterdam: Benjamins. <https://doi.org/10.1075/pbns.38.04dah>.
- de Hoop, Helen & Peter de Swart. 2018. Shifting animacy. *Theoretical Linguistics* 44(1–2). 1–24. <https://doi.org/10.1515/tl-2018-0001>.
- Deal, Amy Rose & Justin Royer. 2025. Mayan animacy hierarchy effects and the dynamics of agree. *Natural Language and Linguistic Theory* 43. 1607–1663. <https://doi.org/10.1007/s11049-024-09648-y>.
- Dowty, David R. 1982. Grammatical relations and Montague Grammar. In Pauline Jacobson & Geoffrey K. Pullum (eds.), *The nature of syntactic representation*, 79–130. Dordrecht: Reidel. https://doi.org/10.1007/978-94-009-7707-5_4.
- Fábregas, Antonio. 2013. Differential object marking in Spanish: State of the art. *Borealis: An International Journal of Hispanic Linguistics* 2(2). 1–80. <https://doi.org/10.7557/1.2.2.2603>.
- Fantini, Jacques, Mélanie Matveeva, Marine Lefebvre & Henri Chahinian. 2024. What is life? rethinking biology in light of fundamental parameters. *Life* 14(3). 280. <https://doi.org/10.3390/life14030280>.
- Feizmohammadpour, Aazamosadat. 2013. *Optional subject-verb agreement in Persian*. Gainesville: University of Florida dissertation.
- Félix, Sara B., Marie Poirier, James S. Nairne & Josefa N. S. Pandeirada. 2024. The breadth of animacy in memory: New evidence from prospective memory. *Psychonomic Bulletin & Review* 31. 1323–1334. <https://doi.org/10.3758/s13423-023-02406-y>.
- Frantz, Donald G. 2017. *Blackfoot grammar, 3rd ed.* Toronto: University of Toronto Press.
- Frascarelli, Mara & Marco Casentini. 2019. The interpretation of null subjects in a radical pro-drop language: Topic chains and discourse-semantic requirements in Chinese. *Studies in Chinese Linguistics* 40(1). 1–45. <https://doi.org/10.2478/sc1-2019-0001>.
- Frawley, William. 1992. *Linguistic semantics*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Gehrke, Berit. 2022. Differences between Russian and Czech in the use of aspect in narrative discourse and factual contexts. *Languages* 7. 155. <https://doi.org/10.3390/languages7020155>.
- Gibbons, Matilda, Andrew Crump, Meghan Barrett, Sajedeh Sarlak, Jonathan Birch & Lars Chittka. 2022. Can insects feel pain? A review of the neural and behavioural evidence. In Russell Jurenka (ed.), *Advances in insect physiology*, vol. 63, 155–229. Academic Press. <https://doi.org/10.1016/bs.aiip.2022.10.001>.
- Gómez Márquez, Jaime. 2021. What is life? *Molecular Biology Reports* 48(8). 6223–6230. <https://doi.org/10.1007/s11033-021-06594-5>.
- Grimshaw, Jane. 2015. The light verbs *say* and *SAY*. In Ida Toivonen, Piroska Csúri & Emile van der Zee (eds.), *Structures in the mind: Essays on language, music and cognition in honor of Ray Jackendoff*, 79–99. Cambridge, MA: MIT Press. <https://doi.org/10.7551/mitpress/10044.003.0008>.

- Haig, Geoffrey, Stefan Schnell & Nils Schiborr. 2021. Universals of reference in discourse and grammar: Evidence from the Multi-CAST collection of spoken corpora. In Geoffrey Haig, Stefan Schnell & Frank Seifart (eds.), *Doing corpus-based typology with spoken language corpora: State of the art*, 141–177. Honolulu: University of Hawai'i Press. <http://hdl.handle.net/10125/74660>.
- Hale, Kenneth. 1973. A note on subject-object inversion in Navajo. In Braj B. Kachru (ed.), *Papers in linguistics in honor of Henry and Renée Kahane*, 300–309. University of Illinois Press.
- Hamedani, Ladan. 2011. *The function of number in Persian*. Ottawa: University of Ottawa dissertation. <https://doi.org/10.20381/ruor-4732>.
- Harnad, Steven. 2016. Animal sentience: The other-minds problem. *Animal Sentience* 1(1). <https://doi.org/10.51291/2377-7478.1065>.
- Hashabeiky, Forogh. 2007. The usage of singular verbs for inanimate plural subjects in Persian. *Orientalia Suecana* 56. 77–101.
- Hofrichter, Ruth, Hasan Siddiqui & M. D. Rutherford. 2021. Early attention to animacy: Change-detection in 11-month-olds. *Evolutionary Psychology* 19(2). <https://doi.org/10.1177/14747049211028220>.
- Hole, Daniel. 2015. Arguments and adjuncts. In Tibor Kiss & Artemis Alexiadou (eds.), *Syntax: Theory and analysis. An international handbook*, 1285–1321. Berlin & New York: De Gruyter Mouton.
- Hornstein, Norbert & Jairo Nunes. 2008. Adjunction, labeling and bare phrase structure. *Biolinguistics* 2(1). 57–86. <https://doi.org/10.5964/bioling.8621>.
- Hutchinson, Corinne & Grant Armstrong. 2014. The syntax and semantics of personal datives in Appalachian English. In Raffaella Zanuttini & Laurence Horn (eds.), *Micro-syntactic variation in North American English*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199367221.003.0006>.
- Isingoma, Bebwā. 2021. Structural properties of Rutooro ditransitive constructions: A lexical functional analysis. *Linguistica Atlantica* 39(1). <https://journals.lib.unb.ca/index.php/la/article/view/32231>.
- Jackendoff, Ray. 1972. *Semantic interpretation in generative grammar*. Cambridge, MA: The MIT Press.
- Jackendoff, Ray. 2002. *Foundations of language: Brain, meaning, grammar, evolution*. Oxford: Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780198270126.001.0001>.
- Jespersen, Otto. 1924. The teaching of grammar. *The English Journal* 13(3). 161–176.
- Jozwik, Kamila M., Elias Najarro, Jasper J. F. van den Bosch, Ian Charest, Radosław M. Cichy & Nikolaus Kriegeskorte. 2022. Disentangling five dimensions of animacy in human brain and behaviour. *Communications Biology* 5. 1247. <https://doi.org/10.1038/s42003-022-04194-y>.
- Ke, Alan Hezao. 2025. Mandarin null objects: Topic-binding over argument ellipsis. *Natural Language and Linguistic Theory*. 1–50. <https://doi.org/10.1007/s11049-025-09670-8>.
- Kearns, Kate. 2011. *Semantics*. 2nd edn. New York: Palgrave Macmillan.
- King, Tracy Holloway. 1995. *Configuring topic and focus in Russian*. Stanford: CSLI Publications.
- Koenig, Jean-Pierre, Gail Mauner & Breton Bienvenue. 2003. Arguments for adjuncts. *Cognition* 89. 67–103. [https://doi.org/10.1016/s0010-0277\(03\)00082-9](https://doi.org/10.1016/s0010-0277(03)00082-9).
- Larson, Brooke. 2013. *The syntax of non-syntactic dependencies*. College Park: University of Maryland dissertation.
- Levin, Beth & Malka Rappaport Hovav. 2005. *Argument realization* (Research Surveys in Linguistics). Cambridge, UK: Cambridge University Press. <https://doi.org/10.1017/cbo9780511610479>.
- Lotfi, Ahmad R. 2006. Agreement in Persian. *Linguistik Online* 29. 123–141.
- Mahootian, Shahrzaf. 1997. *Persian*. London & New York: Routledge.
- Marantz, Alec. 2013. Verbal argument structure: Events and participants. *Lingua* 130. 152–168. <https://doi.org/10.1016/j.lingua.2012.10.012>.
- Matthews, Stephen & Virginia Yip. 2011. *Cantonese: A comprehensive grammar*. 2nd edn. London & New York: Routledge.
- McLaughlin, Brittany Dael. 2014. *Animacy in morphosyntactic variation*. Philadelphia: University of Pennsylvania dissertation. <https://repository.upenn.edu/handle/20.500.14332/28169>.

- Melchin, Paul & Ida Toivonen. 2018. Wh-word conjunction as a test for argumenthood and obligatoriness. In *Proceedings of the Linguistic Society of America* 3, 15:1–11.
- Merriam-Webster. 2025. *It, she*. <https://www.merriam-webster.com/dictionary/it>, <https://www.merriam-webster.com/dictionary/she>. (28 September, 2025).
- Minkoff, Seth. 2000. Animacy hierarchies and sentence processing. In Andrew Carnie & Eithne Guilfoyle (eds.), *The syntax of verb initial languages*, 201–212. Oxford: Oxford University Press. <https://doi.org/10.1093/oso/9780195132229.003.0011>.
- Mizuno, Teruyuki. 2025. Argument ellipsis as topic deletion. *Natural Language and Linguistic Theory*. 1–56. <https://doi.org/10.1007/s11049-024-09645-1>.
- Morottaja, Petter & Marja-Liisa Olthuis. 2022. *Inarinsaamen taivutusoppi*. Inari, Finland: Sämitigge.
- Nenonen, Marja & Jussi Niemi. 2010. Mismatches between grammatical number and conceptual numerosity: A number-decision experiment on collective nouns, number neutralization, pluralia tantum, and idiomatic plurals. *Folia Linguistica* 44(1). 103–125. <https://doi.org/10.1515/flin.2010.004>.
- Nick, Peter. 2021. Sensitive or sentient – a painful debate. *Protoplasma* 258. 235–238. <https://doi.org/10.1007/s00709-021-01621-5>.
- Nordlinger, Rachel, Gabriela Garrido Rodriguez & Evan Kidd. 2022. Sentence planning and production in Murrinhpatha, an Australian ‘free word order’ language. *Language* 98(2). 187–220. <https://doi.org/10.1353/lan.2022.0008>.
- Nurse, Paul. 2020. *What is life? Understand biology in five steps*. Penguin & David Fickling Books.
- Ormazabal, Javier & Juan Romero. 2007. The object agreement constraint. *Natural Language and Linguistic Theory* 25(2). 315–347. <http://www.jstor.org/stable/20532984>.
- Øvrelid, Lilja. 2004. Disambiguation of syntactic functions in Norwegian: Modeling variation in word order interpretations conditioned by animacy and definiteness. In Fred Karlsson (ed.), *Proceedings of the 20th Scandinavian Conference of Linguistics*, 1–17. Helsinki: University of Helsinki. <http://hdl.handle.net/10138/343180>.
- Pawley, Andrew. 2002. The Austronesian dispersal: Languages, technologies, people. In Peter Bellwood & Colin Renfrew (eds.), *Examining the farming/language dispersal hypothesis*, 251–273. Cambridge, UK: McDonald Institute for Archaeological Research.
- Primus, Beatrice. 1999. *Case and thematic roles: Ergative, accusative and active*. Tübingen: Niemeyer.
- Riesberg, Sonja, Kurt Malcher & Nikolaus P. Himmelmann. 2019. How universal is agent-first? Evidence from symmetrical voice languages. *Language* 95(3). 523–561. <https://doi.org/10.1353/lan.2019.0055>.
- Rissman, Lilia. 2013. *Event participant representations and the instrumental role: A cross-linguistic study*. Baltimore: Johns Hopkins University dissertation.
- Rissman, Lilia, Kyle Rawlins & Barbara Landau. 2015. Using instruments to understand argument structure: Evidence for gradient representation. *Cognition* 142. 266–290. <https://doi.org/10.1016/j.cognition.2015.05.015>.
- Rosen, Fritz. 1898. *Persian grammar: A short grammar, dialogues and extracts from Nasir-Eddin Shah’s diaries, tales, etc. and a vocabulary*. Reprinted in 1979. New Delhi: Routledge.
- Rosén, Victoria. 1998. *Topics and empty pronouns in Vietnamese*. Bergen: University of Bergen dissertation.
- Rosenbach, Anette. 2008. Animacy and grammatical variation: findings from English genitive variation. *Lingua* 118. 151–171. <https://doi.org/10.1016/j.lingua.2007.02.002>.
- Russo, Lara. 2021. *Arguments, adjuncts and instruments in English and Turkish*. Carleton University MA thesis.
- Santazilia, Ekaitz. 2023. *Animacy and inflectional morphology across languages*. Brill.
- Sedighi, Anousha. 2006. Animacy: The overlooked feature in Persian. In *Proceedings of the 2004 Annual Conference of the Canadian Linguistic Association*. Winnipeg Meeting.
- Silverstein, Michael. 1976. Hierarchy of features and ergativity. In R. M. W. Dixon (ed.), *Grammatical categories in Australian languages*. Australian Institute of Aboriginal Studies.

- Simpson, Andrew & Binh Ngo. 2022. Null anaphora in Vietnamese. In Chris Shei & Saihong Li Rasmussen (eds.), *The Routledge Handbook of Asian linguistics*, 186–203. Abingdon/Oxon: Routledge. <https://doi.org/10.4324/9781003090205>.
- Somers, Harold L. 1984. On the validity of the complement-adjunct distinction in valency grammar. *Linguistics* 22(4). 507–530.
- Tesnière, Lucien. 1959. *Éléments de syntaxe structurale*. Paris: Klincksieck.
- Toivonen, Ida. 2007. Verbal agreement in Inari Saami. In Ida Toivonen & Diane Nelson (eds.), *Saami linguistics* (Current Issues in Linguistic Theory 288), 227–258. Amsterdam: John Benjamins. <https://doi.org/10.1075/cilt.288.09toi>.
- Toivonen, Ida. 2013. English benefactive NPs. In Miriam Butt & Tracy Holloway King (eds.), *Proceedings of the LFG '13 conference*, 503–523. Stanford: CSLI Publications.
- Toivonen, Ida. 2021. Arguments and adjuncts across levels. In Miriam Butt, Jamie Y. Findlay & Ida Toivonen (eds.), *Proceedings of the LFG '21 conference*, 306–331. Stanford: CSLI Publications. <https://web.stanford.edu/group/cslipublications/cslipublications/LFG/LFG-2021/lfg2021-toivonen.pdf>.
- Tomlin, Russel. 1986. *Basic word order: Functional principles*. London: Croom Helm.
- Torabian, Sajjad & Emily D. Grossman. 2023. When shapes are more than shapes: Perceptual, developmental, and neurophysiological basis for attributions of animacy and theory of mind. *Frontiers in Psychology* 14. 1168739. <https://doi.org/10.3389/fpsyg.2023.1168739>.
- Trompenaars, Thijs, Teresa Angelina Kaluge, Rezvan Sarabi & Peter de Swart. 2021. Cognitive animacy and its relation to linguistic animacy: Evidence from Japanese and Persian. *Language Sciences* 86. 1–17. <https://doi.org/10.1016/j.langsci.2021.101399>.
- Tutunjian, Damon & Julie E. Boland. 2008. Do we need a distinction between arguments and adjuncts? Evidence from psycholinguistic studies of comprehension. *Language and Linguistic Compass* 2. 631–646. <https://doi.org/10.1111/j.1749-818X.2008.00071.x>.
- Udayana, I Nyoman. 2014. Applicative constructions in Mountain Balinese. *Lingual: Journal of Language and Culture* 2(1). <http://ojs.unud.ac.id/index.php/language/article/view/19237>.
- Ünal, Ercenu, Frances Wilson, John Trueswell & Anna Papafragou. 2024. Asymmetries in encoding event roles: Evidence from language and cognition. *Cognition* 250. 105868. <https://doi.org/10.1016/j.cognition.2024.105868>.
- Van Luven, Katie & Ida Toivonen. 2024. The obligatoriness of arguments. *Language and Linguistics Compass* 18(3). e12511. <https://doi.org/10.1111/lnc3.12511>.
- Van Valin, Robert, Jr. & Randy J. LaPolla. 1997. *Syntax: Structure, meaning, and function*. Cambridge, UK: Cambridge University Press. <https://doi.org/10.1017/cbo9781139166799>.
- Wagner, Susanne. 2005. Gender in English pronouns: Southwest England. In Bernd Kortmann, Tanja Herrmann, Lukas Pietsch & Susanne Wagner (eds.), *A comparative grammar of British English dialects. agreement, gender, relative clauses*, 211–352. De Gruyter. <https://doi.org/10.1515/9783110197518>.
- Wood, Jim & Raffaella Zanuttini. 2018. Datives, data and dialect syntax in American English. *Glossa* 2(1). 87. <https://doi.org/10.5334/gjgl.527>.
- Yamamoto, Mutsumi. 1999. *Animacy and reference: A cognitive approach to corpus linguistics*. Amsterdam/Philadelphia: John Benjamins. <https://doi.org/10.1075/slcs.46>.