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A Semantics for the Particle ἄν in and outside Conditionals in Classical Greek

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Abstract
In this paper, we provide a unified semantics for the Classical Greek particle ἄν in its uses both in and outside of conditional sentences. Specifically, working within the framework provided by formal semantic treatments of conditionals in Stalnaker (1968); Lewis (1973); Kratzer (1981) and subsequent work, we propose that ἄν is a universal quantifier over situations—parts of possible worlds. We also detail the interactions between ἄν and the tense and mood features in a clause, arguing, for example, that the semantics of ἄν in combination with a 'fake' past tense morphology (Iatridou 2000), which reflects the presence of an exclusion feature in C, gives rise to a counterfactual implicature. Additionally, we address the issue of the surface distribution of ἄν in the antecedents of some types of conditionals and the consequents of others and argue that, despite its surface distribution, ἄν is always merged into the consequent of a conditional but sometimes undergoes displacement such that it appears to be located within the antecedent. Our proposal not only illuminates a complex phenomenon in Classical Greek, but also contributes to the understanding of the morpho-semantics of mood, conditionals, and counterfactuality in natural language.

Keywords
modality; conditionals; counterfactuals; fake past tense; Classical Greek; cross-world situations

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We consider the uses of the particle ἄν in Classical Greek[1] and propose a formal semantic analysis for them. Our goal is to provide a semantics for the particle, accounting for the environments in which ἄν does or does not occur as well as the position of this particle within a clause. Our analysis builds on that of Gerö (2000) and argues that ἄν marks the presence of a universal quantifier over actual or possible situations.

Studying the semantics of a dead language has its drawbacks—the main one being that, in the absence of native speakers, the researcher cannot obtain truth-value judgments directly and must rely on inferences from corpus data. However, with plentiful and well-described corpus data, as in the case of Classical Greek, this difficulty can be overcome. In turn, consideration of a language with a rich system of fine-grained distinctions in tenses, aspects, and moods can offer new insight into modality, quantification, time, and counterfactuality—and into the connections between these phenomena cross-linguistically. In providing a formal treatment of ἄν, we place this particle and Classical Greek conditionals in a broader cross-linguistic typology of such phenomena.

The structure of the paper is as follows. In the next section, we provide an overview of Classical Greek verbal morphology in the relevant constructions, including conditionals, with and without ἄν. Section 2 presents the theoretical assumptions and places our proposal within the context of the formal semantics literature on modality and conditionals. Our proposal for the semantics and syntax of the particle ἄν is presented and discussed in section 3. We conclude in section 4.

1. Verbal Morphology and ἄν in Classical Greek

1.1. *Uses of ἄν*

In the Classical Studies literature, ἄν is considered to be a part of the system of moods (Goodwin 1890, Schwyzer 1939, Smyth 1956, Slavjatinskaja 1996, inter alia). However, it is clearly separable from the verbal mood morphology. The complex patterns of the co-occurrence of the particle with the various moods and tenses in Classical Greek are described in the literature as follows:

– ἄν is never used with the imperative.
– ἄν is never used with the present or present perfect indicative.
– ἄν is never used with the future indicative (but see footnote 16 on page 27).

[1] We restrict ourselves to the consideration of Attic and Ionic Greek of the 4th and 5th centuries BCE, excluding earlier Homeric Greek as well as the later Koine of the Greek New Testament.

– ἄν is used with the aorist, imperfect, and pluperfect indicative.
– ἄν is used with the subjunctive and optative.

The particle ἄν, when not combined with other elements into a complex form, has two kinds of uses in Classical Greek: modal and iterative. In Classical Greek conditionals, the particle ἄν has a surface distribution such that it appears in the antecedent of some conditionals and in the consequent of others. We will be arguing below in section 3.1 that this surface distribution of ἄν is illusory: ἄν is always merged into the consequent of a conditional but sometimes undergoes displacement such that it appears to be located within the antecedent.

In its iterative use in Classical Greek, ἄν occurs with past tense verbs in the imperfect and aorist indicative ('iterative' uses; in these cases ἄν is optional) (Schwyzer 1939, p. 350, δ), as well as with the subjunctive in subordinate clauses ('generic' uses) (LSJ). Setting aside the subjunctive cases, which we address in the next sections, the iterative ἄν construction expresses quantification over (actual) past situations, as illustrated in (1). In contrast to the modal use of the particle, there is no sense of unreality or counterfactuality here (compare 2).

(1) διηρώτων ἂν αὐτοὺς τί λέγοιεν
ask.1SG.IMPF AN them what say.3PL.PRS.OPT
'I used to ask them what (the poems) meant …' (Plat. Apol. 22b)[2]

Sentences with modal ἄν involve quantification over possibilities (Gerö 2000), as illustrated in comparisons between examples with and without the particle, from a grammar (2a,b) and from original texts (2c,d). On this use, sentences with ἄν often concern situations that are counterfactual (sometimes termed the 'irrealis' use of the particle), as in (2d), or else possible but unlikely (sometimes termed the 'potential' use of the particle).

Modal use of ἄν

(2) a. ἦλθε
go.3SG.AOR.IND
'He/she/it went.'

b. ἦλθε ἄν
go.3SG.AOR.IND AN
'He/she/it would have gone.' (from Goodwin 1890, p. 81)

c. ταῦτα μὲν ἦν ἔτι δημοκρατουμένης τῆς πόλεως
that PRT be.3SG.IMPF still have_a_democracy.PRS.PTCP.MP.SG the city
'That was when the city was still ruled by democracy.' (Plat. Apol. 32c)

d. ἦν δ' ἂν οὗτος ἢ … τῶν ἱππικῶν τις ἢ …
be.3SG.IMPF PRT AN this either … the equestrian.GEN.PL someone or …
'He would be a horse-trainer or … [a husbandman] …' (Plat. Apol. 20b)

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2) We depart from the Leipzig Glossing Rules' standard abbreviations in only the following cases: IMPF = PST.IPFV.IND, AOR = PST.PFV, MP = mediopassive, and MID = middle. All citations to Greek examples use the standard abbreviations of the Perseus Digital Library.

In fact, the example in (2d) is in the consequent of a counterfactual conditional—a frequent context for the modal ἄν. The counterfactual interpretation correlates with the presence of this particle, and also with the past tense of the indicative mood morphology on the corresponding verb.

Looking at mostly Homeric data, Gerö (2000) argues that ἄν should be given a unified analysis, contra others (e.g., Basset 1988; Monro 1891). She claims that the particle appears only in intensional contexts (i.e., in the scope of some intensional operator) and proposes that it can perhaps be identified as an intension operator that maps extensions to intensions (Montague's ^ operator). We will not identify ἄν with Montague's operator, although we agree that it marks the presence of a specific intensional operator. While iterative uses of ἄν, as in (1), appear to contradict this claim, we will argue that the particle is intensional even in these contexts.

Dunkel (1990), p. 129 gives the following etymologies and functions for three different particles that all coalesce into the Classical Greek ἄν:[3]

(3) **Table 1**. Dunkel's theory of the particles κε, κε(ν), and ἄν.

	IE: 3 forms 3 functions	Homer: 3 forms, all w/2 functions	Dialects of the 1st Millennium (BCE): 1 form, 3 functions
**ke*	deictic		potential (w/optative, main clause)
**kem*	emphatic	limiting irrealis	generic (w/subjunctive, subord. clause)
**an*	irrealis		irrealis (w/indicative, main clause)

We focus on Classical Greek in this paper, but the proto-Greek and PIE origins of ἄν are important because the meaning of the particle as a marker of generic (iterative) universal modal quantification may be the result of the fact that two functions—an irrealis[4] and a generic function—were collapsed into one particle, triggering a reanalysis of the particle's meaning into something that is roughly the combination of the two meanings. The different 'uses' of ἄν result from the interaction of this basic meaning with the modal and temporal operators in its environment. In order to understand the behavior of ἄν, we next turn to the moods and tenses in Classical Greek, and to conditionals with and without this particle.

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3) See also Ruijgh (1996) for an alternative etymology for ἄν from κε/κεν, which, he contends, initially meant 'then' (> Proto-Greek *κε 'there'). He argues that both modal and iterative roles of κε/ἄν developed from this meaning.

4) In the Classical Studies literature, the term 'irrealis' refers to the occurrences of ἄν in counterfactuals and, more generally, in modal contexts that may not describe reality. We will not adopt this label, using it only when summarising Classical Studies literature.

1.2. *Moods and Tenses in Classical Greek*

The indicative, subjunctive, and optative moods can co-occur with the particle ἄν in declarative sentences. The particle also occurs in interrogatives, but never in imperatives; we omit non-declaratives from our discussion altogether.

Indicative main verbs without ἄν are run-of-the-mill declarative statements of fact. With ἄν, the past tenses of the indicative can be used in two different constructions. First, the 'potential indicative' construction uses ἄν to indicate a counterfactual possibility (Goodwin 1890; Schwyzer 1939; Smyth 1956; Slavjatinskaja 1996, inter alia) (2b,d). On this use, the past tense is not a reference to a past event—this is an instance of 'fake past' morphology (Iatridou 2000), attested in counterfactual constructions in a variety of languages. Second, the 'iterative ἄν' construction uses the particle as a habitual/generic marker, to indicate a repeated event in the past (1).[5]

Subordinate clauses with indicative verbs are described in grammars as being 'associated with statements of fact that refer to a definite time or particular occasion' (Hoppin 2009). There are exceptions in which subordinate indicative verbs occur in modal contexts, most relevantly in the antecedents of Particular and Counterfactual conditionals. We consider these in the next section.

Main verb uses of the subjunctive are limited; they include hortatory utterances (with a 1st-person plural subject, 'let's VP!') and prohibitions (using aorist, negative commands only, 2nd or 3rd person singular or plural, 'don't VP!'/'let X not VP!'). In all of its independent (main verb) uses, the subjunctive has a modal and future-oriented meaning and the resulting sentence is non-declarative. Subjunctive main verbs do not co-occur with ἄν.

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5) Suggestively, Hindi also has a morpheme that is used as a habitual (iterative) and a counterfactual (CF) marker. Unlike ἄν, the Hindi morpheme can be repeated in some contexts to create an interpretation that is both habitual and counterfactual (i–iii, from Bhatt 1997).

i. agar Ram phal khaa-*taa*
if Ram fruit ate-HAB
'If Ram ate the fruit (CF), …'

ii. Ram phal khaa-*taa*
Ram fruit ate-HAB
'Ram eats/used to eat fruit.' (Habitual)

iii. agar Ram phal khaa-*taa* ho-*taa*
if Ram fruit ate-HAB be-HAB
'If Ram had been eating fruit habitually, …' (Habitual CF)

Note also that, unlike Classical Greek ἄν, the Hindi CF marker occurs in the antecedent of a counterfactual conditional, rather than in the main (consequent) clause.

Setting aside conditionals for the moment, optative main verbs give rise to two different semantic interpretations, depending on the presence or absence of ἄν. Without the particle, optative main verbs indicate wishes and the resulting sentence is non-declarative; these optatives are sometimes preceded by the overt markers εἴθε or εἰ γάρ[6] (4) (cf. Grosz 2011).

With ἄν, this mood is termed the 'potential optative,' and its semantics indicates the presence of a different modal, indicating a future possibility or occasionally a present (counterfactual) possibility (Smyth 1956; Wakker 1986) (5).

(4) ὦ παῖ, γένοιο πατρὸς εὐτυχέστερος
ah child become.2SG.AOR.OPT.MID father.GEN more_fortunate
'Ah, child, may you be more fortunate than your father!' (Soph. Aj. 550)

(5) γνοίης δ' ἂν ὅτι τοῦθ' οὕτως ἔχει
perceive.2SG.AOR.OPT PRT AN that this so have.3SG.PRS.IND
'You may see that this is so.' (Xen. Cyrop. 1.6.21)

In subordinate temporal clauses involving quantification over situations (possible or actual), and in antecedents of general conditionals, the subjunctive is accompanied by ἄν. The subjunctive in combination with ἄν distinguishes general conditionals, which can be thought of as involving a condition that holds of multiple (iterated) occasions, from simple or particular conditionals, in which a condition describes a single situation.

These 'native' uses (i.e., described in grammars as not related to agreement phenomena) of the moods are summarized in (6) below.

(6) The 'native' uses of moods in Classical Greek[7]

– Optative	main clauses, no ἄν	wishes	(optative of wish)
	main clauses, with ἄν	(unlikely) possibilities	(potential optative)
– Subjunctive	main clauses, no ἄν	exhortation/prohibition	future-oriented modal
	subordinate, no ἄν	purpose/fear	
	subordinate, with ἄν	generic/iterative	

6) Literally equivalent to 'if only'; these are not acting as modal operators, but rather indicating the presence of such operators elsewhere in the structure, although a formal characterization of their use is beyond the scope of this paper.

7) Scholars differ in their designations for the level of likelihood associated with the use of optative vs. subjunctive with ἄν: while some say that propositions expressed by the optative are *merely* possible while ones with the subjunctive are possible and likely (Rijksbaron 1994, p. 69, Wakker 1994, p. 112, Wakker 1986), others observe that the optative is used to cover both (merely) possible as well as impossible cases, while the subjunctive is used to cover mainly the possible cases (Smyth 1956, § 2322). We will follow the latter convention; whatever the designation, the use of subjunctive with ἄν correlates with higher likelihood for the associated propositions than the use of the optative with ἄν.

– Indicative	no ἄν	specific fact/situation	
	with ἄν	irrealis/counterfactual	(potential indicative)
	with ἄν	(past) iteration	(iterative indicative)

In subordinate clauses, the form of the verb can be influenced by the tense of the main (indicative) verb: there is an alternation between the subjunctive or indicative and the optative, termed 'the sequence of moods'. A main verb in a non-past tense (termed 'primary'—these are present, future, and present perfect) has a subjunctive or indicative in the subordinate clause. In particular, indirect discourse has the indicative; purpose and fear clauses usually have the subjunctive unless the fear concerns actual rather than possible situations, expressed using the indicative (Smyth 1956, §§ 2614, 2196).

In a sequence of moods, a main verb in a past tense (termed 'secondary' or 'historical'—these include imperfect and aorist forms, as well as the pluperfect) optionally triggers optative mood in the subordinate clause. An indicative with ἄν is never replaced by an optative—that is, a sequence-of-moods optative only replaces ἄν-less indicatives (Schwyzer 1939, p. 331, γ, Smyth 1956, § 2615).

In contrast, when this 'agreement-with-higher-past' optative corresponds to an 'agreement-with-present' subjunctive, any ἄν that might have been associated with the subjunctive almost always drops out (Smyth 1956, § 2607, Schwyzer 1939, p. 331, γ.1). That is, these ἄν-less optatives correspond to subjunctives both with and without ἄν.

Thus, subordinate clauses associated with past-tense main verbs in which the presence of generic/iterative ἄν would be otherwise warranted, may not actually include the particle, 'hiding' it in the sequence-of-moods optative.

Classical Greek has the sequence-of-tense phenomenon as well, where a subordinate verb is marked by (past) tense morphology that is not interpreted but rather serves as agreement with the same tense on the main verb: "especially after verbs of knowing, perceiving, showing, and verbs of emotion (rarely after verbs of saying)" (Smyth 1956, § 2624) (7).

(7) ἐν πολλῇ δὴ ἀπορίᾳ ἦσαν οἱ Ἕλληνες, ἐννοούμενοι μὲν ὅτι
in much PRT perplexity be.3PL.IMPF the Greeks reflect.PRS.PTCP.MP.PL PRT that

ἐπὶ ταῖς βασιλέως θύραις ἦσαν
at the king's gates be.3PL.IMPF

'The Greeks were accordingly in great perplexity on reflecting that they *were* at the king's gates.' (Xen. Anab. 3.1.2)

In addition, Greek has mood assimilation, where the verb in a subordinate clause is marked by optative, subjunctive, or indicative mood morphology to match the mood of the main clause. This is sometimes invoked as an explanation of indicative and optative mood in the antecedents of various types of conditionals (Smyth 1956, § 2183), to which we turn next.

1.3. *Conditionals in Classical Greek*

The use of the different moods and tenses in main and subordinate clauses (with and without ἄν) sets up the pattern of conditional sentences as in (8, 9). The standard labels for various types of conditionals in the grammars of Classical Greek are taken to refer to both the meaning and the form of these constructions. Yet, the form is primary: for instance, Smyth (1956), § 2329 gives the moods and position of ἄν for the future less vivid conditional (8, 9h), and then proceeds to describe several slightly different uses of this construction.

(8) **Table 2**. Main "textbook" types of conditional sentences in Classical Greek.

Classics term	Antecedent	Consequent	Meaning[8]
Particular (including *Future most vivid, FMostV*)	Indic. (incl. *future*)	Indic. (incl. *future*)	(9a) (*9b*)
General (including Present & *Future more vivid, FMV*)	Subj. + ἄν	Indic. (present & *future*)	(9c) (*9d*)
Past general	Opt.	Indic. impf.	(9e)
Present counterfactual	Indic. impf.	Indic. impf. + ἄν	(9f)
Past counterfactual	Indic. aor.	Indic. aor. + ἄν	(9g)
Future less vivid (FLV)	Opt. (or ind.)	Opt. + ἄν	(9h)

The conditionals in the table are grouped according to their moods and the use of ἄν.

Particular conditionals use the indicative mood without ἄν in both the antecedent and the consequent (9a). When both the antecedent and the consequent of a particular conditional have future verbs, the construction is labeled Future Most Vivid (FMostV, 9b).

Non-past general conditionals use subjunctive with ἄν in the antecedent (the generic ἄν), and indicative mood in the consequent. When the indicative main verb is in the present, the label is Present General (9e), while general conditionals with future verbs in the consequent are termed Future More Vivid (FMV, 9d).

Past general conditionals have optative verbs in the antecedent and indicative imperfect in the consequent (9e). They do not include ἄν; however, since the main verb is in the past tense, the sequence-of-moods optative in the antecedent may be "hiding" the particle.

8) This is just a preliminary and pre-theoretical indication of the semantics of these sentences. A thorough discussion, based on the literature and our corpus study, follows.

Next, constructions labeled Counterfactual use indicative in the antecedent, and indicative with ἄν in the consequent. Counterfactuals using imperfect in both clauses are termed Present Counterfactual (9f), while those using aorist verbs are Past Counterfactual (9g).

Finally, conditionals which use optative verbs in both antecedent and consequent, with ἄν in the consequent, are called Future Less Vivid (FLV, 9h).

We exemplify these constructions below, with a brief indication of their semantics.

Particular: A single-case conditional regarding a specific situation in the actual world

(9) a. εἴπερ γε Δαρείου καὶ Παρυσάτιδός ἐστι παῖς … οὐκ
if indeed Darius and Parysatis be.3SG.PRS.IND son not

ἀμαχεὶ ταῦτ᾽ ἐγὼ λήψομαι
without_resistance these I take.1SG.FUT.IND

'If indeed he is the son of Darius and Parysatis, I will not take these things without resistance.' (Xen. Anab. 1.7.9)

Future Most Vivid: A conditional regarding a specific situation in the future

b. ἀποκτενεῖς γάρ, εἴ με γῆς ἔξω βαλεῖς
kill.2SG.FUT.IND for if me land.GEN.SG out throw.2SG.FUT.IND
'For you will slay me if you cast me out of the land.' (Eur. Phoen. 1621)

General present: Generalization in the present

c. καὶ ἐ-ἀν ἴσοις ἴσα προστεθῇ, τὰ ὅλα ἐστὶν ἴσα.
and if-AN equals equals add.3SG.SBJV.PASS, the wholes be.3SG.PRS.IND equal
'And if equals are added to equals, the wholes are equal.' (Euc. 1.CN.2)

Future More Vivid: Generalization in the future

d. τί ἔσται τοῖς στρατιώταις, ἐ-ἀν αὐτῷ ταῦτα
what be.3SG.FUT.IND.MID the soldiers.DAT if-AN him this

χαρίσωται
oblige.3PL.AOR.SBJV.MID

'What will the soldiers have, if they oblige him in this?' (Xen. Anab. 2.1.10)

General past: Generalization in the past

e. εἴ πού τι ὁρῴη βρωτόν, διεδίδου
if anywhere any sees.3SG.PRS.OPT food give_out.3SG.IMPF
'If he saw any food anywhere, he gave (it) out.' (Xen. Anab. 4.5.8)

Present counterfactual: Counterfactual regarding the present

f. ταῦτα δὲ οὐκ ἂν ἐδύναντο ποιεῖν, εἰ μὴ καὶ διαίτῃ μετρίᾳ
these but not AN can.3PL.IMPF do.IPFV.INF if not also diet measured

ἐχρῶντο.
use.3PL.IMPF

'But they would not be able to do these things, if they were not also following a temperate diet.' (Xen. Cyrop. 1.2.16)

Past counterfactual: Counterfactual regarding the past

g. οὐκ ἂν ἐποίησε Ἀγασίας ταῦτα, εἰ μὴ ἐγὼ αὐτὸν ἐκέλευσα.
not AN do.3SG.AOR.IND Agasias these if not I him order.1SG.AOR.IND
'Agasias would not have done these things, if I had not ordered him (to).' (Xen. Anab. 6.6.15)

Future less vivid: Statement about unlikely or possible situation in the future

h. ... θαυμάζοιμ' ἂν εἰ οἷός τ' εἴην ἐγὼ ὑμῶν ταύτην
be_surprised.1SG.PRS.OPT.MP AN if able PRT be.1SG.PRS.OPT I you this

τὴν διαβολὴν ἐξελέσθαι ἐν οὕτως ὀλίγῳ χρόνῳ ...
the prejudice take_away.PFV.INF.MP in so little time

'... I would be surprised if I were able to remove this prejudice from you in so short a time ...' (Plat. Apol. 24a)

Several generalizations emerge from the table and examples in (9).

First, we see that the alternation between subjunctive + ἄν and optative in the antecedents of general conditionals is an instance of the sequence-of-moods phenomenon. This is suggested both by the correlation with the tenses of the indicative in the main (consequent) clause, and also by the presence of quantification over situations in the meaning of these conditionals. That is, while all conditionals are analyzed in formal semantics as involving quantification over worlds or situations, particular conditionals nevertheless can be thought of as referring to a specific topic situation in the actual world (and its epistemic counterparts)—a single-case conditional (Kadmon 1987). In contrast, the present, future, or imperfect indicative verbs in the consequent clauses of general conditionals do not refer to a specific topic situation, but rather to a set of situations over which the generalization holds—multi-case conditionals (Kadmon 1987).

Second, note that the only way to achieve a counterfactual interpretation is by using the particle ἄν, which in the "textbook" conditionals is located in the main clause. If we take seriously the implicature of low likelihood of the antecedent situation in FLV conditionals, then we can include FLV conditionals in this counterfactual group, and say that in these "textbook" cases, ἄν occurs

in the main clause if and only if such a contrary-to-fact inference is present.[9] In any case, the optative + ἄν in the FLV and the past indicative + ἄν in the counterfactual conditionals are simply instances of the potential optative and potential indicative constructions. The counterfactual and FLV conditionals can be either single- or multi-case, but tend to be mostly the former.

These main-clause constructions with ἄν, together with the described mood-assimilation in Classical Greek subordinate clauses, suggests that we should treat consequent-clause morphology in conditionals as more semantically meaningful than antecedent morphology in the counterfactual and FLV conditionals. We seek to explain the various interpretations that arise in conditionals with and without ἄν through the interaction of this particle with the mood, tense, and aspect of the main (consequent) clause, where possible.

Third, the correlation between a higher past tense and a lower optative mood in the sequence-of-mood scenarios raises the question of underlying structure in the sentences with potential optatives—could such sentences, too, have (covert) past higher in the structure? If the optative in subordinate clauses and the potential optative are instances of the same phenomenon, why does the latter, but rarely the former, co-occur with the particle ἄν?

Finally, note that the past morphology in both the antecedent and consequent of the present counterfactual conditionals does not seem to be interpreted as referring to the past. What is the semantic contribution of this 'fake past,' and what is the explanation for its presence?

In the next section, we turn to this final question in the context of formal semantics, and use it as a key to building our proposal for the semantics of ἄν.

2. Previous Research: Conditionals, Counterfactuals, and Past

2.1. *Conditionals and Situations in Formal Semantics*

In most formal semantic treatments following Stalnaker (1968); Lewis (1973); Kratzer (1981), and subsequent work by these and other authors, conditionals are thought of as involving quantification over possibilities. Possibilities are usually modeled as possible worlds or related objects: possible situations (parts of possible worlds) or else tuples of entities including possible worlds (e.g., world-assignment pairs).

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9) The distinction between the location of the particle in the main vs. subordinate clause in the "textbook" conditionals seems to predict a correlation between the surface syntactic position of ἄν and the interpretation of the sentence. As we make clear in section 3.1, we claim that there is no such correlation, and propose a different explanation for the difference in the surface position of ἄν, which has no bearing on its semantics.

Quantificational structures include three main parts: a modal operator (a quantifier over possibilities), a restrictor narrowing the range of the quantifier to a contextually-determined set of possibilities, further narrowed down by the contents of the *if*-clause, and finally the nuclear scope of quantification—the condition that holds of the quantified possibilities, expressed by the main (consequent) clause (Montague 1974; Partee 1991; Kamp and Reyle 1993, inter alia).

The modal quantifier may be overt, as in (10), or else silent. The contextually-determined set of possibilities restricting the quantification even before the antecedent is considered is selected based on the lexical properties of the modal and the influence of context. Following Kratzer (1981); Kratzer (1991), the contextual contribution to modal interpretations is separated into two dimensions—the modal base and the ordering source.

(10) a. If the lights are on, Mary must be home.
b. If we are on Route 183, we might be in Lockhart. (von Fintel and Heim 2009)

First, the accessibility relation provides the modal base, a conversational background against which the modal is interpreted—that is, the accessibility relation is a function which, for every possible world (including the actual one), provides the set of worlds most relevant for the modal. Thus, an epistemic conversational background is the set of propositions representing what we know, a legal conversational background is the set of propositions representing what the law provides, etc. (Kratzer 1991).

In addition, not every world helpfully provided by the accessibility relation is as good as every other world. Here is where similarity comes in—we only want those worlds which are close-enough (or closest) to the actual world. That is, even in counterfactual worlds, we want some features of the actual world preserved. In sentences such as (11), the conversational background ensures that we only consider possibilities in which spiders are born with eight legs. We don't want to consider a world in which I am a spider who, due to misfortune, lost a leg and now only has seven—yet such a world may well be a member of the accessible set. Thus, various authors have proposed different similarity mechanisms that are responsible for selecting the closest, best, and most law-like of the accessible worlds. In Kratzer's framework, the ordering source is a set of propositions that imposes a partial ordering on the modal base, based on the number of these propositions which are true in a world. The ordering source can be deontic (the more actual-world laws are followed in *w*, the closer *w* is to the actual world), stereotypical (the closer *w* is to the normal course of events, the closer it is to the actual world), etc.

(11) If I were a spider, I would have eight legs (in view of the biological properties of spiders in the actual world).

In our proposal for Classical Greek conditionals, we will utilize situations—parts of possible worlds. Situation semantics (Kratzer 2009) was developed first by Jon Barwise and colleagues (Barwise 1981; Barwise and Perry 1983), formalizing the idea originally attributed to J.L. Austin that utterances are about particular situations (Austin 1979).

To take a classic example, consider the sentence 'Claire has the three of clubs':

> We might imagine, for example, that there are two card games going on, one across town from the other: Max is playing cards with Emily and Sophie, and Claire is playing cards with Dana. Suppose someone watching the former game mistakes Emily for Claire, and claims that Claire has the three of clubs. She would be wrong on the Austinian account, even if Claire had the three of clubs across town. (p. 122 Barwise and Etchemendy 1987)

Possibilistic situation semantics extends the idea of evaluating utterances relative to situations to evaluating predicates relative to situations. All propositions are treated as sets of possible situations, which are ordered by a 'part of' relation $\leq$ such that if $s \leq s'$, then $s + s' = s'$. The maximal situation that any situation s is related to by $\leq$ is the possible world w_s—that is, w_s is not a part of any situation other than w_s.

Below is a good example that shows the usefulness of possibilistic situation semantics:

(12) Everyone is asleep and is being monitored by a research assistant.

The quantifier 'everyone' ranges over people who are part of the 'research-subject' situation, and thus does not include research assistants.

The connection to possible worlds allows situations to be used in analyzing modal sentences, including conditionals.

In Kratzer's (2009) situation semantics, situations are treated like Lewis-style individuals: each is a part of at most one world, but can have counterparts in other worlds. Thus, Arregui (2009) offers a semantics for English counterfactual conditionals with *would* which relies on the notion of a 'modal part of' relation between situations:

(13) Given two situations s_i and s_j, s_i is a modal part of s_j
$s_i \leq_m s_j$ iff there is some s_t such that s_t is a counterpart of s_i and $s_t \leq s_j$.

The modal part of relation between situations in different worlds is a special case of the counterpart relation between different-world individuals (Lewis 1971). *Would* is analysed as a universal modal. Its modal base is the set of all situations from different possible worlds in which a contextually-salient set of laws is observed. The situations are ordered based on their similarity to the actual-world situation of which the entire conditional is predicated: thus, for Arregui (2009) the similarity-based counterpart relation between situations

replaces the ordering source of Kratzer (1991). In this framework, (11) receives the following semantics:

(14) (11) is true of the actual-world situation s, given by the past tense,
iff every law-like situation s_L' such that $s \leq_m s_L'$ and my counterpart in s_L' is a spider,
extends to a lawlike situation s_L'' such that $s_L' \leq s_L''$ and my counterpart has eight legs in s_L'',
where s_L is a situation that satisfies the set of actual-world laws L salient in the context (including biological properties of spiders).

This notion of similarity focuses only on the relevant features of the actual world. For example, in (11), only the features of the actual-world that relate to spiders matter in determining similarity, while irrelevant features such as geopolitical history are ignored in selecting the best possibilities to quantify over. Note that the entire conditional describes a property of the actual-world situation s: this kind of predication in which a modal property is ascribed to an actual-world individual (and its counterparts) is termed *de re* modal predication. Thus, (11) has *de re* predication of s and of me.

In our analysis of the particle ἄν and of Greek conditionals we will adopt many features of Arregui's framework, including a modal base that consists of situations, an ordering that depends on a similarity-based counterpart relation, and *de re* modal predication.

2.2. *Fake Past in Conditionals—Iatridou* (2000)

In a seminal paper, Sabine Iatridou considers the interpretation of past-tense morphology (among other elements) in conditionals. English present counterfactual conditionals of the form (15a-i) convey the information that the antecedent clause and the consequent clause don't hold at present (15b-i). Past counterfactuals of the form (15a-ii) convey that the antecedent and consequent do not hold in the past (15b-ii).

(15) a. i. If he were smart, he would be rich.
ii. If he had been smart, he would have been rich.
b. i. He is not smart now; he is not rich now.
ii. He was not smart, and he was not rich (past situation—no information about the present).

The information in (15b) is not asserted: thus, for instance, we can follow up on (15a-i) with the assertion that the antecedent holds, without a contradiction; or with the assertion that the antecedent is false, without a redundancy.

(16) a. In fact, he's stinking rich, so I guess he's smart, too.
b. In fact, he's dirt poor, so I guess he's stupid.

Thus, Iatridou (2000) concludes that counterfactuality arises as an implicature.

We tentatively suggest that, in Classical Greek, counterfactuality in sentences with ἄν is an implicature as well.[10]

The conditionals in (15a, 17) all have fake past tense in them, which must appear in the antecedent and consequent in both English and Modern Greek: in (15a-i) he is not rich/smart *now*; likewise in (15a-ii) he is not rich/smart at some point in the past (so, it's *past* not pluperfect).

Iatridou argues that past conditionals (15a-ii) do have one layer of non-fake past, since they cannot be realizable in the future, in contrast to English Future Less Vivid (FLV) conditionals, such as (17b):

(17) a. If he had taken the syrup, he would've gotten better. (Not good as an instruction to a caregiver.)
b. If he took the syrup, he would get better. (OK as an instruction to a caregiver.)

The FLV conditional (17b), (15a-ii) conveys the implicature that in the actual world (w_o) the negation of the antecedent (he does not take the syrup) is more likely to become true than the antecedent (he takes the syrup);[11] in suitable contexts it can also be used to emphasize speaker ignorance about whether *p* or *not p* will become true.

Iatridou (2000) proposes that the past tense morpheme is actually an 'exclusion' morpheme (18). Iatridou assumes, after Kamp and Reyle (1993), among others, that future is really a modality, and therefore the only true tenses are past and present.[12] Thus, when interpreted temporally, the exclusion morpheme indicates that the topic time precedes the utterance time (18b). When interpreted modally, it indicates that the topic worlds do not include the actual world (18c). Thus, without forcing counterfactuality, on its fake-past (modal) use, the morpheme leads to an implicature that the proposition is not applied to the actual world because it is false in the actual world—the counterfactual implicature.

(18) a. ⟦+EXCL⟧ = The topic time or world excludes the utterance time or world
b. Applied to times—exclusion from utterance time (now) → true past
c. Applied to worlds—the topic worlds don't include the actual world → fake past, counterfactual implicature

What is the relationship between the semantics of English FLV (17b) and present counterfactual conditionals (15a-i)?

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10) Note that here we are in disagreement with Wakker (1994), pp. 150–155, who treats at least some counterfactual conditionals in Ancient Greek as presupposing falsity of the antecedent.

11) But see Giannakidou (2009) for a discussion of the FLV in Modern Greek and criticism of Iatridou's analysis with regard to the likelihood that the negation of the antecedent in an FLV will come true.

12) Alternatively, exclusion can be supplemented by a precedence condition, vacuous in the modal case.

It may seem that the FLV cannot contribute a counterfactual implicature since future cannot be factual to begin with. However, the FLV conditionals often do contribute an implicature that in the actual world the negation of the antecedent is more likely to become true than the antecedent proposition. In a way, this is the same counterfactuality implicature as in the present counterfactual, but conveyed with respect to a point in the future rather than the present. We follow Iatridou (2000) in considering this to be the same implicature in all cases, which we continue to term "counterfactual" even in the FLV conditionals in Classical Greek.

As with any implicature, the counterfactual implicature is absent in those contexts where it is clear that the antecedent is true, or will become true in the actual world. After uttering the FLV conditional in (19), Socrates proceeds to testify that he has seen the antecedent fulfilled. We can conclude that in this case, the counterfactual inference is canceled.[13]

(19) εἰ οὖν ὑμῶν οἱ δοκοῦντες διαφέρειν … ἡτινιοῦν ἀρετῇ τοιοῦτοι
if then you those seem.PRS.PTCP.PL be_superior.IPFV.INF whatever virtue such

ἔσονται, αἰσχρὸν ἂν εἴη
be.3PL.FUT.IND.MID shameful AN be.3SG.PRS.OPT

'If then those of you who are supposed to be superior … in any virtue whatsoever are to behave in such a way, it would be disgraceful.' (Plat. Apol. 35a)

Iatridou (2000) argues that the exclusion feature, introduced by the past tense morphology in FLVs and in present and past counterfactuals in English and Modern Greek, is responsible for the counterfactual implicatures in these constructions.

Subsequent research indicates that modal interpretations of the exclusion feature correspond to a higher syntactic position of this morpheme than on the temporal interpretation. Thus, Bjorkman (2011) argues that when this feature is interpreted in the T(ense) position, it yields past time, but it can also be interpreted in C(omplementizer) position, where it yields modal meanings that do not include the actual world.

13) We were unable to find any examples of Present or Past Counterfactual conditionals where the antecedent was true; however, we did find many examples where the antecedent was presented as possible. This difference in the strength of counterfactuality expressed in the FLV conditionals on the one hand, and Counterfactual conditionals on the other hand, is probably due to the nature of the speaker's evidence for statements about the future (indirect at best), in contrast to statements about the present and past (where speakers are presumed to be well-informed, all else being equal).

3. Proposal for ἄν

We propose that ἄν represents a modal universal quantifier (similar to English 'would'), ranging over situations (20).

(20) $[\![\text{ἄν}]\!]^{g,w} = \lambda\, p_{\langle st\rangle}.\lambda\, q_{\langle st\rangle}.\lambda\, s \leq w\, [(\forall\, s' \in M : p(s') = 1)\, \exists\, s''\, [s' \leq s'' \,\&\, q(s'') = 1]]$

Paraphrase: The conditional is true of an actual-world situation s iff, whenever the antecedent is true in a situation s', the consequent is true in a situation s'' which extends s'.

The situations that this quantifier ranges over ($s' \in M$ in the formula) may come from one or more possible worlds (cf. Arregui 2009); this allows the particle to have modal interpretations, unlike a universal quantificational adverb such as *always*. The nature of the set M will largely determine the interpretation of ἄν in the specific examples. The modal uses of ἄν arise when M contains only maximal situations (worlds), and the formula in (20) becomes a standard universal modal. Iterative uses result when M contains only subsituations of the actual world. The use of ἄν in antecedents of General conditionals (the generic use) combines the features of modal and iterative uses—quantification in these cases is over non-maximal subsituations of different possible worlds. The features of the actual-world situation s (currently absent from the body of the formula) and other temporal and modal ingredients in the sentence, discussed in subsection 3.2, will participate in establishing M to derive the various uses of ἄν.

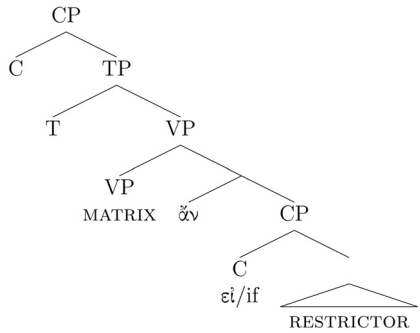
Before we proceed to examine the semantic derivations involving ἄν, let us briefly consider the syntax of the particle.

3.1. *The Syntax of ἄν*

Given that the non-unified analyses of ἄν generally divide the uses of ἄν into two groups depending on whether the particle occurs in the antecedent or the consequent of a conditional, solving the problem of the position of ἄν in conditionals is essential to arguing for a unified analysis. In order for the semantics and the syntax to match up well, ἄν must c-command its restrictor, the antecedent clause. The main problem in Classical Greek is that ἄν at least appears to be located within the restrictor clause of some conditionals (namely, future more vivid and present general conditionals). In this section, we will argue that ἄν is always merged into the consequent of a conditional but sometimes undergoes displacement such that it appears to be located within the antecedent.

Syntactically, the consequent of a conditional is the matrix clause of a sentence, and the antecedent is an adjunct CP headed by the 'if' element and right-adjoined at VP (Bhatt and Pancheva 2006). Under the hypothesis that ἄν is located within the consequent of all Classical Greek conditionals, this yields the schematic structure for a conditional in (21).

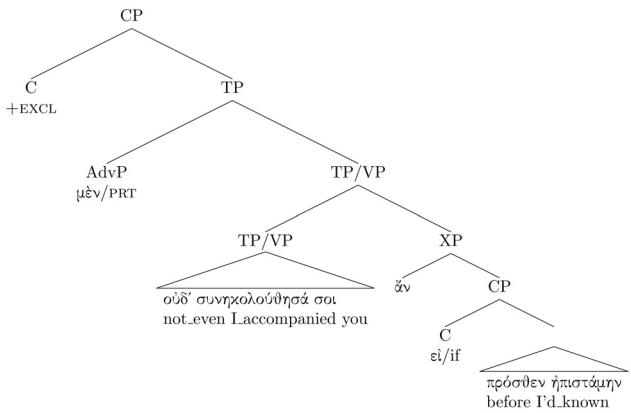
(21)



In general, ἄν occurs second, second to last, or last in the IP domain of the sentence, suggesting a position at the edge of the IP domain (cf. Smyth 1956, § 1764, "ἄν does not begin a sentence or clause."). It is linearized either on the right or left, with a process of local dislocation—an operation at PF that effects affixation of one element to another under linear adjacency (Embick and Noyer 1999; Embick and Noyer 2001; Noyer 2001; Embick 2003), inverting the position of ἄν and the first or last word in the IP domain to satisfy ἄν's enclitic nature. The antecedent generally moves to precede the consequent, via post-syntactic fronting. Thus, the structure of (22) at LF is as in (23).

(22) εἰ μὲν πρόσθεν ἠπιστάμην, οὐδ' ἂν συνηκολούθησά σοι.
if PRT before know.1SG.IMPF not_even AN accompany.1SG.AOR.IND you
'If I'd known this before, I wouldn't even have accompanied you.' (Xen. Anab. 7.7.11)

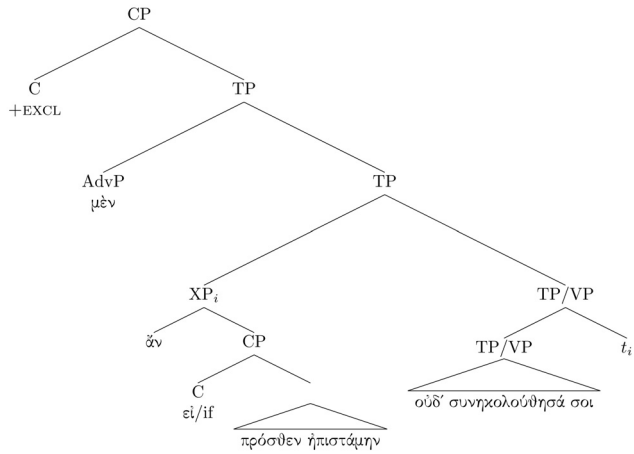
(23)[14]



14) We use TP/VP in places in order to remain agnostic on various irrelevant syntactic issues in Classical Greek—namely, whether the verb raises to T and where sentential negation is located.

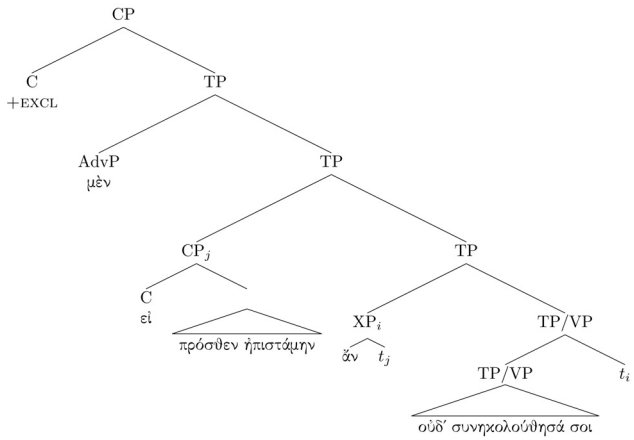
Deriving the second-in-IP position evidenced in (22) is a two-part process. First, ἄν together with the restrictor is fronted and adjoined at the TP level (24).

(24)



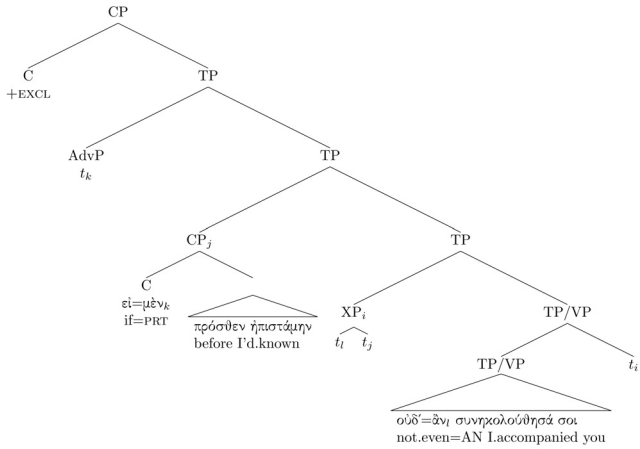
This is followed by further fronting of the restrictor alone (25).

(25)



Finally, both the sentential particle μέν and ἄν undergo local dislocation and as a result are displaced one word to the right (26).

(26)

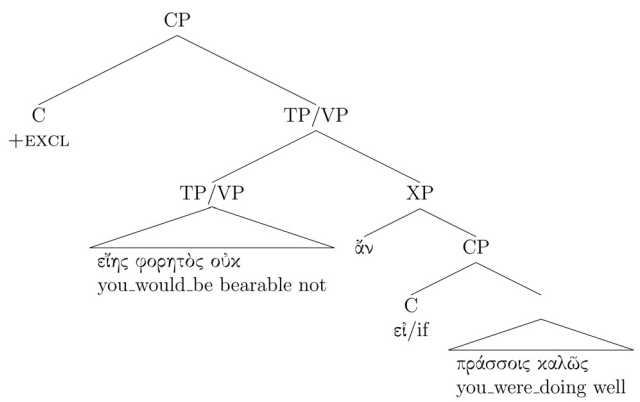


Alternatively, in some conditionals (27), ἄν appears as the second-to-last or last word in the matrix clause.

(27) εἴης φορητὸς οὐκ ἄν, εἰ πράσσοις καλῶς
be.2SG.PRS.OPT bearable not AN if do.2SG.PRS.OPT well
'You would be unbearable if you were doing well.' (Aesch. PB 979)

The variability between placement last in the matrix clause and second-to-last must mean that local dislocation is optional at the right edge, as opposed to being obligatory at the left edge. In contrast to the derivation for (22), the derivation for (27) is shorter, all processes are likely prosodically motivated, operating apart from the semantics. No processes are strictly necessary.

(28)

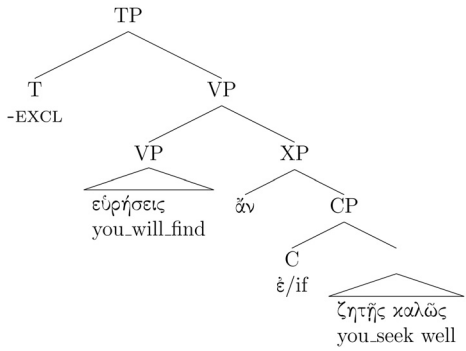


At first glance, it may appear very difficult to derive the proper word order when ἄν is in the antecedent, as occurs in the present general and future more vivid conditionals (29).

(29) ἐ-ἀν ζητῇς καλῶς, εὑρήσεις
if-AN seek.2SG.PRS.SBJV well find.2SG.FUT.IND
'If you seek well, you will find.' (Plat. Gorg. 503d)

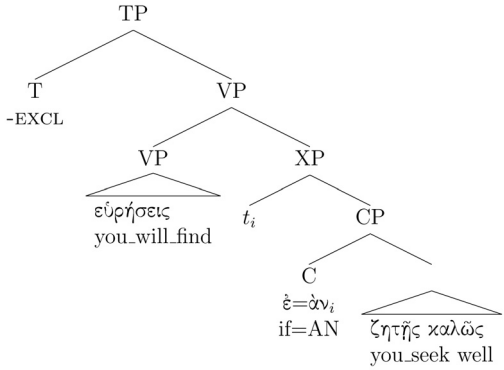
The solution is to use the same LF as in (23) and (28) above (30).

(30)

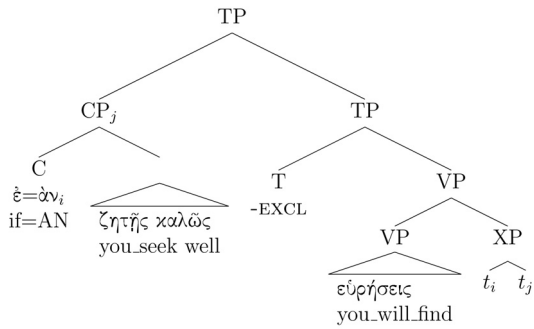


Then, the process of local dislocation operates immediately, cliticizing ἄν to the proclitic conditional complementizer (31); this is optionally followed by fronting of the now inseparable ἄν + restrictor complex (32).

(31)



(32)



Thus, a unified syntactic treatment of ἄν enables us to proceed with a unified semantics for the particle.

3.2. *Semantics of Counterfactual and Iterative Uses of ἄν*

In counterfactual conditionals (present and past), as well as in potential indicative main-clause examples, the interpretations arise from the following ingredients. First, the past tense morphology on the main-clause verb represents agreement with the higher exclusion feature, interpreted modally. This means that the topic situations are not part of the actual world. Extending Iatridou (2000)'s analysis, we propose that on its modal use, the exclusion feature gives rise to a set of maximal non-actual topic situations—that is, to a set of non-actual topic worlds.

Second, with respect to quantification, topic denotations are part of the restrictor (Partee 1991), regardless of their position. Thus, even though it is not syntactically part of the conditional antecedent, the exclusion feature partially defines a modal base: a modal quantifier, such as ἄν, will range over worlds (maximal situations) that do not (necessarily) include the actual world.

The modal ἄν quantifies over this set, further restricted by certain laws and features of the actual world, and by the antecedent of the conditional.

Third, turning now to these laws and features, we follow (Kratzer 1991) in conceiving of these restrictions on modal quantifiers as imposed in two separate steps. These steps operate in all conditionals, and represent a contextual connection between the antecedent and the consequent. As a first step, the contextual constraints, which we represent as a predicate of possibilities *Cont*, influence the accessibility relation. These constraints on possibilities include a set of salient actual-world laws; accessible worlds in the modal base are restricted to those in which these laws operate (compare Kratzer 1991; von Fintel 1994; von

Fintel and Heim 2009, for discussion of restrictions on modal quantifiers). For instance, in the deontic conditional (33a), quantification is over contextually-appropriate (situations that are parts of) worlds in which dormitory rules are obeyed.

(33) a. If you bring a guest to your dorm, you must meet in the lounge.
b. If you brought a guest into your bedroom, the R.A. would scream at you.

In part inspired by the discussion of counterfactual conditionals in Arregui (2009), we propose that these laws can be partially reified as features of actual-world situations—for instance, in (33a), the existence of a dormitory rule, perhaps posted in writing at the dorm entrance, or simply existing in the abstract. We depart from Arregui's proposal in that these facts are not represented as actual situations. In general, as a second step constraining the modal, we propose a similarity relation based on reference to specific actual-world facts. The conditional or modal sentence as a whole is predicated *de re* of these facts, just as Arregui (2009) proposes for situations. Thus, for instance, in (33a), we consider a set of situations in which dorm-rules are obeyed; within this set, we select situations in which the posted dorm-rule is in force.

We avoid conceptualizing the relevant features of the actual world as a single situation in order to maintain a uniform analysis for different kinds of conditionals and constructions with ἄν. A *res* situation works for the counterfactual cases—the features it represents are present in the accessible situations if those situations contain a counterpart of the *res* situation. In contrast, several non-overlapping situations in the actual world cannot all contain the *res* situation as a part; yet we will need to quantify over just such a set of situations to model iterative uses of ἄν. However, such situations can all share a feature or fact—for instance, the same dorm rule may be operational in them.

Importantly, unlike Arregui, we make no connection between these features of the actual world and the past tense morphology in counterfactual sentences: thus, in (33b), we select the presently-posted dorm-rule as the *res* of modal predication.

Fourth, the propositions denoted by the subordinate and main clauses of the conditional are tenseless—the situations in which these propositions are true are not restricted with respect to their temporal location.

The difference between past and present counterfactuals is aspectual (see (34) repeated from (9e–f) above). Imperfect is compatible with the eventuality overlapping with (non-past) reference time. In contrast, "… the aorist indicative is most commonly used to signify that the state of affairs concerned is completed with regard to (is anterior to) a state of affairs mentioned in the ensuing context … Sometimes, however, the state of affairs expressed by the aorist

indicative is completed with regard to (is anterior to) a state of affairs mentioned in the preceding context ('past-in-the-past')" (Rijksbaron 1994, p. 20). Since future completed events in Classical Greek are marked as future, rather than aorist, this leads to an inference that the completed eventuality took place in the past. Thus, like their English counterparts, the Classical Greek past counterfactuals convey that the eventualities in the antecedent and consequent are temporally past, despite morphological differences with English.

Present counterfactual: Counterfactual regarding the present

(34) a. ταῦτα δὲ οὐκ ἂν ἐδύναντο ποιεῖν, εἰ μὴ καὶ διαίτῃ μετρίᾳ
these but not AN can.3PL.IMPF do.IPFV.INF if not also diet measured

ἐχρῶντο.
use.3PL.IMPF

'But they would not be able to do these things, if they were not also following a temperate diet.' (Xen. Cyrop. 1.2.16)

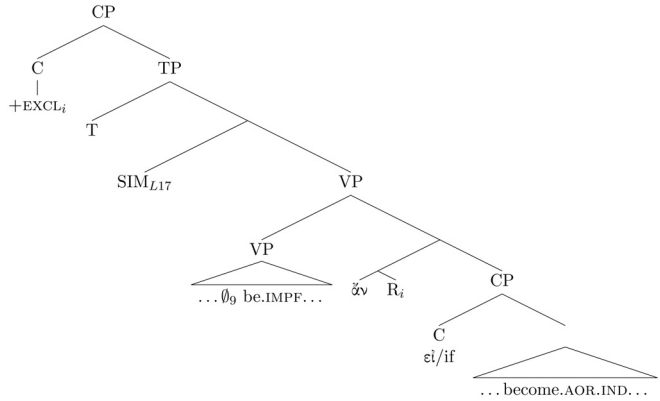
Past counterfactual: Counterfactual regarding the past

b. οὐκ ἂν ἐποίησε Ἀγασίας ταῦτα, εἰ μὴ ἐγὼ αὐτὸν ἐκέλευσα.
not AN do.3SG.AOR.IND Agasias these if not I him order.1SG.AOR.IND
'Agasias would not have done these things, if I had not ordered him (to).' (Xen. Anab. 6.6.15)

Finally, an (optional) agreement mechanism responsible for mood assimilation in Classical Greek results in indicative mood in the antecedent.

These ingredients combine as in (35), to create a meaning in (36b) for a counterfactual sentence such as (36a, 2d)

(35)



(36) a. εἰ μέν σου τὼ ὑεῖ πώλω ... ἐγενέσθην, ... ἦν δ'
if PRT your the sons colts ... become.3DU.AOR.IND.MID ... be.3SG.IMPF PRT

ἄν οὗτος ... τῶν ἱππικῶν τις ...
AN this the equestrian someone ...

If your two sons had happened to be two colts, ... this (one) would be a horse-trainer ...'
(Plat. Apol. 20a)

b. $[\![(36a)]\!]^{g,w} = \lambda\, s \leq w\, [\ (\forall s' :$ — contribution of ἄν
your sons are born as calves in s' — contribution of if-clause
& $s' \in \{\, w : w \neq w_o$ & $Cont(w)\}$ — R_i partially provided by Excl_i
& $\exists\, s'''$ [actual-world facts $g(17)$ are in force in s''' & $s''' \leq s'$]) — SIM with facts 17
$\exists\, s''$ [$s' \leq s''$ & $g(9)$ is a horse-trainer in s'']] — contribution of then-clause

Paraphrase: the conditional is true in a situation s iff in a set of situations s'

- which are maximal non-actual law-like situations (i.e., non-actual law-like worlds), ***(exclusion feature selects the modal base)***
- in which there is a counterpart of actual-world facts referred to by $g(17)$, ***(similarity with res facts provides the ordering source)***
- and in which (counterparts of) your sons are born as calves, ***(if-clause)***
- every situation s' extends to the situation s'', such that (counterpart of) $g(9)$ is a horse-trainer in s'' ***(then-clause)***

Turning to the iterative uses of ἄν, we propose that the particle has exactly the same meaning as before (20), but involves a very different accessibility relation—one that instead of providing different possible worlds, gives a set of situations which are all part of an actual past situation invoked by the past-tense morphology in T (imperfect or aorist). The LF is otherwise identical to the one for a counterfactual conditional, but with an implicit antecedent clause (that is, no if-clause in the structure). The indicative mood is chosen by default.

Thus, an example such as (1), repeated below, is analyzed as in (37).

(1) διηρώτων ἄν αὐτοὺς τί λέγοιεν
ask.1SG.IMPF AN them what say.3PL.PRS.OPT
'I used to ask them what (the poems) meant ...' (Plat. Apol. 22b)

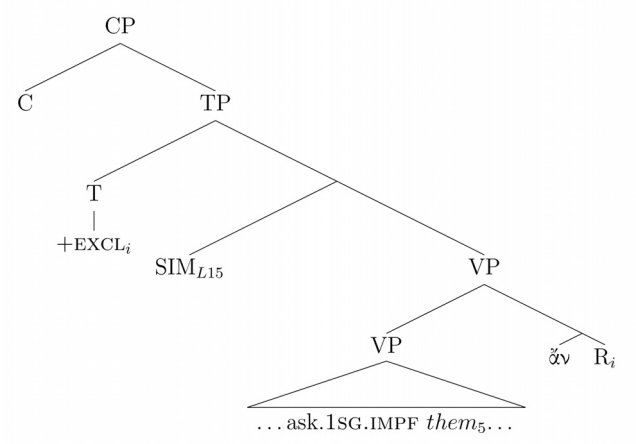
(37) a. $[\![(1)]\!]^{g,w} = \lambda\, s \leq w\, [\ (\forall s' :$ — contribution of ἄν
& $s' \leq w$ — R_i limits s' to actual-world situations
time $(s') \subseteq$ topic interval t & t precedes now — R_i partially provided by Excl_i
& $\exists\, s'''$ [actual-world facts $g(15)$ hold in s''' & $s''' \leq s'$] — SIM with facts 15
& $Cont(s')$) — 's' is contextually appropriate'
$\exists\, s''$ [$s' \leq s''$ & Socrates asks $g(5)$ in s'']]

Paraphrase: the sentence is true in a situation s iff in a set of situations s'

- which are subsituations of the actual world, ***(modal base contextually limited to actual situations)***

– and which precede the utterance time,
(exclusion in T limits modal base to past situations)
– in which the facts referred to by *g*(*15*) hold,
(similarity with res facts provides the ordering source)
– every situation *s′* extends to a situation *s″* in which Socrates asks *g*(*5*)
(main clause)

(37) b.



Our analysis of these two core uses of ἄν places the semantic differences between them in the choice of the accessibility relation, which, in turn, relates to the interpretation of past-tense morphology as true or 'fake' past. The proposal treats modal sentences as predicates of actual-world facts, which are represented as features of situations. Next, we explore the consequences of this approach for other sentences with and without ἄν.

3.3. *Conditionals with and without ἄν*

We now turn to general conditionals, starting with the present general (PG) and future more vivid (FMV) conditionals. Consider the example (9c), repeated and analyzed below.

(9c) καὶ ἐ-ὰν ἴσοις ἴσα προστεθῇ, τὰ ὅλα ἐστὶν ἴσα.
and if-AN equals equals add.3SG.SBJV.PASS, the wholes be.3SG.PRS.IND equal
'And if equals are added to equals, the wholes are equal.' (Euc. 1.CN.2)

These sentences express a generalization over present or future situations—thus, the tense morphology on the indicative main verb is interpreted, and there is no exclusion feature in C giving rise to a counterfactual implicature. The tense morphology invokes situations overlapping with (the counterpart of) now in present general conditionals, and future with respect to now in FMV

conditionals. PGs and FMVs are multi-case conditionals,[15] which can be modeled using quantification over situations, where multiple situations per world can be included. Thus, the accessibility relation in these cases is very similar to the one used in the iterative-ἄν examples (37), with the only difference being that it is not restricted to parts of an actual past situation.[16]

In a sense, this use of ἄν blends elements of the iterative and modal meanings associated with the particle. The accessibility relation involves situations from multiple worlds (like counterfactuals). However, situations from the actual world are also included, and they come from (counterparts of a) non-past time interval (like iterative uses) (38).

In the antecedents of these conditionals, Classical Greek uses the subjunctive mood, which in subordinate clauses normally reflects the presence of a higher modal, and higher non-past morphology. Without attempting to propose a semantic analysis of the subjunctive mood, we note that, as in many other kinds of subordinate clauses, subjunctive verbs in general conditionals indicate the following confluence of material higher in the structure: (i) the presence of a quantifier (as opposed to non-quantificational contexts), (ii) quantification over situations (rather than whole worlds), and (iii) a non-past, non-exclusive main clause (the absence of the +EXCL feature) (39). The particle ἄν cliticizes onto the conditional complementizer, essentially becoming a part of the antecedent.

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15) Note that on this point we are in agreement with Wakker (1994), p. 111:

> … I claim that the division particular [= our single-case] vs. general [= our multi-case] conditional must be used (as an auxiliary factor) to describe the Greek conditional system: periods consisting of ἐάν with subjunctive and a present indicative in the main clause, and periods consisting of εἰ with optative and an imperfect in the main clause are invariably general. The general character is accompanied by formal marking and is not context-dependent. In all other cases, however, it is the context that decides whether the *if*-clause in question must be interpreted as specific or general.

16) In fact, there are an unknown number of examples of future indicative main verbs with ἄν and no antecedent that can be seen as exactly parallel to the iterative ἄν (16). The number of these examples is unknown because they are usually, if not always, emended by editors (Smyth 1956, § 1793, Gildersleeve 1900, § 432).

In this example, the original future indicative προτρέψετε, attested in two manuscripts, has been emended to an aorist optative προτρέψαιτε (Burnet 1903).

i. ὑμεῖς ἄρα … τῶν νῦν ἀνθρώπων κάλλιστ' ἂν προτρέψετε εἰς φιλοσοφίαν
you then … the now men best AN urge_on.2PL.FUT.IND to philosophy

καὶ ἀρετῆς ἐπιμέλειαν;
and virtue attention

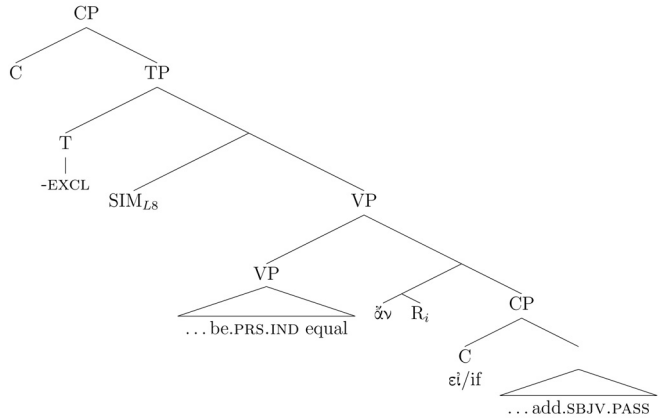
'Will you (pl.) then … be the best of men (alive) now to encourage (one) to philosophy and attention to virtue?' (Plat. Euthyd. 275a)

(38) $[\![(9c)]\!]^{g,w} = \lambda\, s \leq w\, [\ (\forall\, s' :$ — contribution of ἄν
& equals are added to equals in s' — contribution of if-clause
& (counterpart of) time (s') $\subseteq$ topic time t — R_i gives situations, not worlds
& t does not precede now — tense restricts R_i to non-past situations
& $\exists\, s'''$ [actual-world laws $g(8)$ operate in s''' & $s''' \leq s'$] — SIM with laws $L8$
& $Cont(s')$) — 's' is contextually appropriate'
$\exists\, s''$ [$s' \leq s''$ & the wholes are equal in s'']]

Paraphrase: the conditional is true in a situation s iff in a set of situations s'

- which overlap with (in the case of present tense) or follow (if future) (the counterpart of) the utterance time
  (tense restricts the modal base to non-past situations from different worlds)
- in which there is a counterpart of actual-world facts referred to by $g(8)$,
  (similarity with res facts provides the ordering source)
- and in which (counterparts of) equals are added to equals,
  (if-clause)
- every situation s' extends to the situation s'', such that (counterpart of) the wholes are equal in s''
  (then-clause)

(39)



The past general conditionals are minimally different from the non-past examples: their matrix clauses include a +EXCL feature in T, invoking past situations. These conditionals look like they don't have ἄν—this is an illusion, created by the fact that subjunctive + ἄν becomes optative without ἄν in the presence of higher past tense. The conditions that result in the optative mood in the subordinate clause, thus, include (i), the presence of a quantifier (as opposed to non-quantificational contexts), (ii) quantification over situations (rather than whole worlds), and (iii) a past main clause (the presence of the +EXCL feature in T).

This brings us to another type of construction which involves the optative. FLV conditionals and potential optative examples in general are the only type

of construction with ἄν that have a non-indicative main clause.[17] Because these constructions give rise to a counterfactual-like implicature, but are future-oriented, we propose that they include an accessibility relation which is both restricted by a +EXCL feature in C, like the counterfactual conditionals, and elements which express future orientation (the actual nature of these elements we leave for future research). In main clauses without past morphology, future orientation may be expressed by future tenses of the indicative, or by subjunctive mood. Sequence-of-moods in indirect discourse or in purpose clauses demonstrate that there is an alternation between indicative or future-oriented subjunctive (in the presence of higher non-past) and optative mood (in the presence of a higher past). Thus, the combination of future-oriented elements and +EXCL feature higher in the structure is expressed as an optative.

The choice of mood morphology in Greek seems to form a scale from the most specific conditions triggering an optative (a higher +EXCL feature in addition to the factors that otherwise trigger a subjunctive), to the 'elsewhere' case of the indicative.

Finally, consider the factors that influence the presence or absence of the particle ἄν in conditionals. In the framework we adopt, all conditionals include a modal quantifier. In those conditionals where ἄν is absent, namely the particular conditionals, there is a silent modal. The formal difference we propose between them is that ἄν is a quantifier over situations—parts of possible worlds, whereas the silent modal quantifies over maximal situations—whole worlds. In the terms of Kratzer (1989), this roughly corresponds to the distinction between generic universal quantification (with ἄν) and accidental universal quantification (with the silent modal)—the mismatch between Kratzer's distinction and the conditionals with and without ἄν concerns the counterfactual conditionals, in which the +EXCL feature restricts the (inherently situational) quantification to whole worlds.

To summarize, we propose that the difference between particular and all other 'textbook' types of Greek conditionals lies in the nature of objects quantified over—in the case of particular conditionals, whole worlds, and in the case of other conditionals, situations. The semantic differences between the various kinds of non-particular conditionals are due to the different accessibility relations that restrict the set of situations that ἄν quantifies over (the modal base). The different relations arise from the differences between the contents of the C-T domains in these constructions, reflected in the overt mood and tense morphology in the main and subordinate verbs. Our main points about these are summarized in the table below.

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17) An anonymous reviewer points out that non-declarative main clauses such as hortatory subjunctives, optatives of wish, and imperatives also occur in the main clause of conditionals.

(40) **Table 3**. Elements of modal constructions in Classical Greek.

quantifier/ its domain	accessibility relation	tense morphology	situations per world	conditional/ construction
ἄν: situations	worlds not including w_o	fake	single	counterfactual, potential indicative
ἄν: situations	worlds not including w_o	n/a (future situations)	single	FLV, potential optative
ἄν: situations	only includes $s \leq w_o$ time(s) $\subseteq$ topic time	true	multiple	iterative indicative
ἄν: situations	may include $s \leq w_o$ time(s) $\subseteq$ topic time	true	multiple	general, FMoreV
$\emptyset$: worlds	contextually-determined	true	single	particular, FMostV

4. Conclusions

We have presented a formal semantic treatment of the particle ἄν in Classical Greek, proposing that it denotes a universal quantifier over situations—parts of possible worlds. Our proposal has accounted for several descriptive generalizations regarding the use of the particle. Specifically, we have explained the correlation between the 'fake' past tense morphology in sentences with ἄν and the presence of a counterfactual implicature in counterfactual conditionals and the potential indicative construction. Utilizing the idea that past-tense morphology in such sentences reflects the presence of an exclusion feature in C, and noting that future-oriented modal clauses acquire optative mood in the presence of higher past (due to sequence-of-moods), we have extended our account to the future less vivid conditionals and the potential optative construction.

The semantic contrast with the iterative indicative construction, in which the past is interpreted and no counterfactuality arises has been explained by the placement of the exclusion feature in T, rather than C. As a result, the accessibility relation yields a set of actual-world past situations, rather than non-actual worlds for the modal to quantify over.

We have also argued that the absence of the particle ἄν in the past general conditionals is an illusion created by the sequence-of-moods phenomenon in which an optative without ἄν replaces a subjunctive verb accompanied by the particle. The absence of fake past, and the presence of ἄν in general conditionals results in their non-counterfactual, multi-case interpretation.

A suggestive generalization that we have not accounted for concerns the correlation between the surface position of ἄν in the conditional and its interpretation: the particle's surface position in counterfactual and FLV conditionals (which have the +EXCL feature in C) is in the consequent clause, but ἄν appears

on the surface in the antecedent clauses of general conditionals. We leave this syntactic-semantic interface correlation as a challenge for future work.

Our proposal has consequences for the formal semantic treatment of modality. A uniform treatment of the wide variety of constructions with ἄν requires us to abandon an approach to similarity proposed in Arregui (2009). She proposes that a counterfactual sentence is a modal predicate of a specific actual-world situation. Most-similar situations that are chosen for the modal to quantify over are those that contain a counterpart of the *res* situation. However, this notion of similarity will not work for the iterative uses, where the possibilities that the modal quantifies over include non-overlapping actual-world situations. Instead, we propose to treat conditionals (and other modal constructions) as predicates of actual-world facts, conceptualized as features of situations. These facts can be modal themselves, representing the existence of actual-world laws. Conditionals and other modal constructions are then predicated *de re* of these actual-world fact referents.[18]

Space limitations have prevented us from being able to consider all the constructions in which ἄν appears in Classical Greek. Some of these, such as generic temporal clauses and free relatives with ἄν have implications for the correct formal semantic treatment of similar constructions cross-linguistically.

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18) Such reification of modal goings-on in the actual world offers hope for overcoming a general problem for possible-world semantics of conditionals, discussed in Zvolenszky (2002). A discussion of this problem and the consequences of our approach lies far outside the scope of this paper.

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