Towards a formal semantics for modal particle ἄν in Classical Greek
Sophia Malamud and Iryna Osadcha

Introduction. The Ancient Greek modal particle ἄν provides an important testing ground for formal semantic theories of modality and mood. In the Classical Studies literature, this particle is considered to be a part of the system of moods (Goodwin 1890, Smyth 1956, Slaviatinskaya 1996, *inter alia*). However, it is clearly separable from the verbal mood morphology. At the same time, every sentence in which ἄν is used is considered modal in its interpretation (Gerö 2000). While examples in which ἄν is repeated (2) seem to suggest that it can be vacuous, contrasts such as (1) show that ἄν is a modal operator, scoping over the sentence and introducing quantification over possibilities. Assuming that the repetition in (2) is not meaningful, we propose that ἄν is indeed a marker introducing a universal modal quantification. We further propose that the modal base is an epistemic one, and suggest a mechanism through which counterfactual entailments, often associated with ἄν, arise.

(1)   a. ἦλθε   b. ἦλθε   **ἄν** (from Goodwin 1890, page 81)
          went.3sg.aor.ind   went.3sg.aor.ind **AN**
          'He[/she/it] went'   'He[/she/it] would have gone'

(2)   ὥσπερ οὖν **ἄν**,εἰ τῷ ὄντι ξένος ἐτύγχανον   ὤν,
          even-as hence **AN** if the be.part.pres foreigner happen.1sg.imperf.ind be.pres.part
συνεγιγνώσκετε   δήπου **ἄν** μοι ...
excuse.2pl.imperf.ind certainly**AN** me
          'Hence, just as you would, of course, if I were really a foreigner, pardon me...' (Plato *Ap.* 17d)
          Ἄν is never used with the imperative. We make general (and uncontroversial) assumptions about the semantics of subjunctive and optative moods without providing details. These assumptions enable us, however, to formulate a detailed dynamic semantics for AN along the lines sketched in Asher and McCready 2007. We develop this semantics to begin addressing the complex interactions of past tense morphology and counterfactuality, as discussed in Iatridou 2000, Ippolito 2006.

The data. We have conducted a corpus study, collecting sentences with AN in classical Greek from Plato's *Apology* (Perseus Digital Library, www.perseus.tufts.edu), as well as Classical Attic examples drawn from the literature (Goodwin 1890, Smyth 1956, van Riemsdeijk 1984, Wakker 1996, Gerö 2000, Slaviatinskaja 1996). We also collected all the examples of conditionals without AN from *Apology*. The examples were analysed to note the kind of modality involved (based on the context, as well as on translations), the truth-value of the conditional antecedent, and the form of the verb in both antecedent and consequent. While most examples we found were indeed counterfactual (2), quite a number involved antecedents that were true (3), or could possibly be true (4).

(3)   ἐγὼ οὖν δεινὰ **ἄν** εἴην εἰργασμένος,...
          I   then terrible **AN** do.1sg.perf.opt.mp
εἰ…τότε μὲν οὖ   ἐκεῖνοι ἔταττον   ἔμενον
if   then PART where they   order.3pl.imperf.ind.act remain.1sg.imperf.ind.act   (Plato *Ap.* 28d)
          'So I should have done a terrible thing, if...I remained where they stationed me'

(4)   εἰ μὲν οὖν   ταῦτα λέγων   διαφθείρω   τοὺς νέους,
          if PART   then these say.part.pr.act corrupt.1sg.pr.ind.act the   young
ταῦτ᾽ **ἄν** εἴη   βλαβερά.
these **AN** be.3sg.pres.opt.act   injurious   (Plato *Ap.* 30b)
          'If by saying these things I corrupt the youth, these things must be injurious'

The basic proposal. Following the intuition that ἄν is a part of the mood system, we suggest that it lives in C and scopes over the main (consequent) clause, but below the conditional operator (5)[1].

---

1 We are placing AN in the consequent to reflect the order in which operators come into play. A structure (i) in which AN scopes over both clauses, but where AN is interpreted as a modal whose restriction includes the antecedent, and nuclear scope is the consequent, is completely equivalent, since restriction update comes before the consequent update (cf. Heim 1992) in the test denoted by AN.   i. [=> [AN [Irrealis [I really am a foreigner]] [you pardon me]]]

(5) [**C' =>** [*Irrealis* [I really am a foreigner]]   [C' AN [you pardon me]]]

We propose that ἄν introduces an epistemic modal similar to English *would* (6). Following the proposal in Asher and McCready 2007, the dynamically changing context includes, in addition to the world and time of evaluation, two sets of epistemic possibilities (rather than a single accessibility relation): the global set G, which includes the world of evaluation, and F, the focussed set of epistemic possibilities, which may include counterfactual possibilities, and are used, e.g., in cases of modal subordination. Ἄν is underspecified between quantifying over G and F, thus a dynamic update involving it can be counterfactual. Statically, this is equivalent to requiring that the proposition modified by ἄν is true in all the epistemic possibilities in the relevant set. There is nothing counterfactual about this semantics.

(6) [[*AN p*]] = 1. Both G and F are tested that they can be updated to include p, and are so updated OR
                 2. F is tested and updated to include p, and G is rewritten to include the updated F

In non-counterfactual conditionals, ἄν interacts with the semantics of the conditional (7).

(7) [[=> q p]] tests that 1. every context that supports q, also supports p   AND
                           2. every focussed epistemic possibility that supports q, also supports p

In counterfactual conditional, it also interacts with the semantics of irrealis moods (subjunctive and optative) or of the irrealis operator introduced by the past tense morphology (8). Thus, the structure in (5) gives rise to the semantics in (we indicate which elements contribute which meaning parts) (9).

(8) [[Irrealis q]] revises the world of evaluation, G, and F to the closest/most similar world and sets of
                 epistemic possibilities that support/include q.

(9) <u>Every (focussed) possibility (AN)</u> *revised with the proposition (Irr)* that I am a foreigner **also supports the proposition (=>)** that you pardon me, and <u>is updated with that proposition (AN).</u>

Irrealis and past. Ἄν quantifies over antecedently given set of epistemic possibilities (Kratzer 1981, Asher and McCready 2007). When this set is revised by an irrealis operator so that it no longer includes the actual world, counterfactuality ensues. All counterfactual conditionals in our data had either an irrealis mood (subjunctive or optative) or a past tense indicative (pluperfect, aorist or imperfect)[2]. At the same time, in non-counterfactual conditionals with ἄν, indicative past antecedents were always truly past – that is, describing events or states that occurred prior to utterance time. We therefore conclude that indicative counterfactual AN-conditionals have "fake past" which serves as an irrealis operator (Iatridou 2000, Ippolito 2006). One possible mechanism for achieving this is to propose that the past serves to "rewind" the time at which the epistemic possibilities G and F are available (in the spirit of Condoravdi 2001, Ippolito 2006). Thus, present tense (which involves no past component) and present perfect (which involves an interval with two boundaries, rather than a single past) are incompatible with this construction. In contrast, pluperfect, aorist, and imperfect can be decomposed into a past which revises epistemic possibilities, and a perfect or aspectual component that provide information about event structure. In all our examples of indicative counterfactual conditionals with ἄν, both antecedent and consequent were past, and thus the respective roles of tense in these two clauses remain unexplored. Further research is needed to determine the details of this "rewinding" of epistemic possibilities, and whether parallels can be drawn between various AN-counterfactuals and Ippolito's (2006) one-past vs. two-past (obligatorily counterfactual) subjunctive conditionals.

Conclusion. We propose that ἄν is a universal epistemic modal operator. This is the first step towards understanding this particle, and its interactions with other modal and temporal operators.

Selected Rereference. Asher & McCready 2007. *Were, would, might,* and a compositional account of counterfactuals. *Journal of Semantics* 1:1-37. **Ippolito** 2006. Semantic composition and presupposition projection in subjunctive conditionals.*Linguistics & Philosophy* 29 - **Gerö** 2000.The Usage of ἄν and χμ in Ancient Greek: Towards a Unified Description. *Glotta 76*. - **Goodwin** 1890. Syntax of the moods and tenses of the Greek verb.-**Slaviatinskaya** 1996.*Uchebnik drevnegrecheskogo jazyka. (Handbook of Ancient Greek)*. Filologija. - **Smyth** 1956. Greek grammar.

---

2   Several examples had infinitive indicative antecedents and/or consequents. We assume that infinitives are modal, and thus may be introducing the irrealis operator. We leave the details of this interesting use of infinitives to future research.