

Counterfactuality and past

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Abstract

Many languages have past-and-counterfactuality markers such as English simple past. There have been various attempts to find a common definition for both uses, but I will argue in this paper that they all have problems with a) ruling out unacceptable interpretations, or b) accounting for the contrary-to-fact implicature of counterfactual conditionals, or c) predicting the observed cross-linguistic variation, or a combination thereof. By combining insights from two basic lines of reasoning, I will propose a simple and transparent approach that solves all the observed problems and offers a new understanding of the concept of counterfactuality.¹

1 Introduction

It has long been observed that, across a large number of unrelated languages, markers of the past also refer to counterfactual contexts. This relation is also easily observable in English:

- (1) a. Erica sat down and *drank* a glass of water.
- b. If Erica *drank* more water (in the present/ future), she would be healthier.
- c. If Erica *had drunk* a glass of water (in the relevant past), she would not be this dehydrated.

In section 2, I will present the main facts from English and other languages that this article is concerned with. As I will discuss in section 3, the puzzling correlation between past and counterfactuality has attracted a great deal of research in typology, cognitive linguistics and formal semantics. I will discuss in particular two lines of reasoning: the remoteness-based approach, in which English simple past (ESP) and related markers express a distance from the actual present

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21 – represented by Iatridou (2000); and the back-shifting approach, in which ESP shifts the per-
22 spective to the past, which also allows quantification over otherwise historically inaccessible
23 worlds – as in Ippolito (2013).

24 I will argue that the two lines of reasoning exhibit largely complementary sets of problems:
25 Iatridou (2000) provides a compositionally simple and transparent approach that explains the
26 contrary-to-fact implicature of counterfactual sentences, but fails to account for the observed
27 distribution and various interpretations of ESP. Ippolito (2013) covers all attested and unattested
28 readings of ESP, but relies on complex assumptions about the syntax-semantics interface and
29 does not directly provide an explanation of the implicatures of counterfactual sentences. Both
30 approaches fail to predict the cross-linguistic variation we observe.

31 Readers who are primarily interested in my proposal rather than the problem statement
32 may jump directly to section 4, where I will argue that a combination of insights from Iatridou
33 (2000) and Ippolito (2013) can solve all the observed problems. From Iatridou (2000), I will take
34 the idea of exclusive quantification over counterfactual worlds. Since Iatridou (2000) operates
35 within a parallel-worlds framework that allows for only a binary distinction between the actual
36 and non-actual (or counterfactual) worlds, universal quantification over factual worlds leads to
37 an overgeneration of readings. But a modified version of the branching-time framework used by
38 Ippolito (2013) allows for a three-way distinction between actual, possible and counterfactual
39 indices. Exclusive quantification over counterfactual indices in such a tripartite structure al-
40 lows for compositionally transparent, lexically precise definitions of TAM (tense, aspect, mood)
41 markers such as ESP and correctly predicts the cross-linguistic variation we find. This three-way
42 distinction of modal domains into the actual, the possible and the counterfactual is the main the-
43 oretical innovation of my approach. I will therefore refer to it as 3D modality, short for *three*
44 *domains of modality*.

45 I will then discuss the truth conditions of counterfactual conditionals that derive from my
46 assumptions and argue that they take a middle ground between two traditional extremes: While
47 some authors have defended the position that conditionals do not have truth conditions at all,
48 there is widespread agreement among linguists that counterfactual conditionals have vague
49 truth conditions that can, in principle, be tested in the actual world. What follows from my
50 assumptions is that counterfactuals do have vague truth conditions which can however never
51 be made true or false by observations in the actual world.

52 In section 6, I proceed to show that the contrary-to-fact implicatures of counterfactual condi-
53 tionals can be easily derived from my previous assumptions in combination with some basic
54 considerations of pragmatic fitness of utterances relative to a Question Under Discussion. I will
55 show that the 3D-modality approach correctly predicts some of the environments in which the
56 implicature does not arise, including Anderson-conditionals.

57 Sections 7.1 and 7.2 are not essential to the understanding of my proposal, but add some
58 background and perspective. Section 7.1 briefly retraces the history of applying branching time
59 to counterfactual conditionals and reflects on probable reasons why the particular proposal made
60 here has not been considered before. In section 7.2, I discuss the implications of 3D modality
61 for the concept of counterfactuality and the classification of specific utterances, including polite
62 questions containing *would*, future-oriented conditionals with *would* and indicative conditionals
63 with contrary-to-fact implicatures.

64 2 The main empirical observations

65 The main correlation between past and counterfactuality in ESP, which has already been illus-
66 trated by the examples in (1), goes back at least to Jespersen (1931) and has been discussed many
67 times since.

68 Less attention is typically paid to the meanings ESP can *not* express. A clear definition
69 of what I mean by counterfactuality will be given in the following sections. For our current
70 purposes, I will consider all conditionals as counterfactual that contain *would* in the apodosis.
71 The following examples illustrate the range of observations I will discuss. ESP can refer to the
72 actual past:

73 (2) If Laura took the train this morning, she will arrive at 3pm.

74 ESP can also refer to the future in conditionals with *would* in the protasis, which I take to mean
75 that it can refer to the counterfactual future:

76 (3) If Laura took the train tomorrow, she would arrive at 3pm.

77 ESP can not refer to the future in a conditional with *will* in the apodosis. I take this to mean
78 that it can not refer to the possible future.²

79 (4) If Laura #took/ takes the train tomorrow, she will arrive at 3pm.

80 ESP can not refer to the past in a conditional with *would* in the apodosis. I take this to mean it
81 cannot refer to the counterfactual past:

82 (5) If Laura #took/ had taken the train yesterday, she would have arrived at 3pm.

83 To refer to the counterfactual past, it is necessary to use past perfect – see example (1-c); at
84 the same time, English past perfect (EPP) can also be used with a reference to the counterfactual
85 future. This has first been discussed by Iatridou (2000) and is most closely associated with the
86 work of Ogihara (2000). I will explore it in more detail in section 3.

87 (6) Martha arrived in Paris yesterday. If she had arrived there TOMORROW, she would have
88 missed the *Fête de la Musique*.

89 As I will argue in more detail in section 3, previous approaches to past-and-counterfactuality
90 markers suffer from a potential overgeneration of interpretations by not ruling out a reference
91 to possible futures and the counterfactual past, and, in some cases, to the actual present. One
92 might suspect that pragmatic principles of relevance and paradigmatic contrasts are responsible
93 for those restrictions, but: 1) if so, no one has spelled out this option yet; and 2) the fact that
94 past-and-counterfactuality markers in other languages do not have the same restrictions makes
95 such a position much harder to maintain.

96 The Oceanic language Daakaka shows what a marker may look like that actually encodes
97 a reference to anything but the actual present. The “distal” TAM clitic *t* can refer to the actual
98 past, the counterfactual past and present, the possible future and the counterfactual future, de-
99 pending on the environment (von Prince, 2018). The Daakaka distal marker is used to express
100 discontinuous past, similar to the English simple past in combination with stative predicates
101 (Altshuler & Schwarzschild, 2012):

102 (7) *pus myane tomo, nya ye t=i bivian tu vu ten*
103 cat with rat 3D 3D DIST=COP friend DIST good very
“the cat and the rat, they used to be very good friends” (4597)

²We will see further below that I make the rather novel assumption that the future is split into possible and counterfactual futures. The reader does not have to accept this assumption; the distributional observation about ESP is valid regardless.

104 In temporal and conditional clauses, the marker expresses reference to the episodic past without
105 a discontinuity effect:

- 106 (8) *[or ka te myaek] te mwe me vyan te syu ane apyaló-ten*
place MOD DIST be.night DISC REAL come go DISC land TRANS ship-native
107 “at night, he went and sat down in the canoe” (4723)

108 In licensed contexts, it can express a reference to the counterfactual present or future:

- 109 (9) *Nye na bwe dimyane ka ebya-ok we pwer kyun, [na=t ka pini or.]*
1SG 1SG CONT want MOD wing-3S.POSS POT stay just 1SG=DIST fly fill place
110 “I wish I had wings, I would fly around everywhere.”

111 However, von Prince *et al.* (2018) have found, that in future counterfactual conditionals, the
112 potential marker is preferred in the apodosis. The distal marker can still occur in the protasis
113 of the conditional. The following example is from a storyboard-based elicitation, in which one
114 speaker asks the other one if he will play volleyball the next day. He says that he will not because
115 he hurt his hand, he goes on to say:

- 116 (10) *ka na=t ple volibol te volibol ka we me syute vy-ok*
COMP 1SG=DIST play volleyball then volleyball ASR POT come hit hand.of-1SG.POSS
117 *te myanok ente saka ne map.*
then wound this NEG.ASR NEG.POT heal
118 “If I played volleyball, the volleyball would hit my hand and then my wound wouldn’t
119 heal” (Lafet_AN.14/15)

120 In contrast to ESP, the Daakaka distal can also refer to the counterfactual past:

- 121 (11) *[tati, saka w=i vyaven en=tak te] [saka ko=t esi nye]*
dad MOD.NEG POT=COP woman DEM=PROX DISC MOD.NEG 2SG=DIST see 1SG
122 “father, if it had not been for this woman, then you would never have seen me again”
123 (4856)

124 In the protasis of conditional clauses, it can refer to the possible future. The structure of this
125 clause is identical to future counterfactuals in Daakaka:

- 126 (12) *[ki=t me a=tak] ka na w=ane kimim*
2P=DIST come LOC.DEM=PROX MOD 1S POT=eat 2P
127 “if you come here, then I will eat you!” (3133)

128 So, according to the available descriptions, the Daakaka distal behaves like ESP with respect to
129 (1a) and (1b), but unlike ESP with respect to criteria (2a) and (2b), in the list of criteria given
130 towards the end of this section.

131 Similar facts have been reported for other expressions cross-linguistically, including the
132 TAM marker *kua* in Faka’uvea (Moyse-Faurie, 2002), the *transitional aspect* in Cèmuhi (Riv-
133 ierre, 1980) and the TAM marker *tō* in Mwotlap (François, 2003). Except the Daakaka distal
134 marker, however, none of these expressions have been investigated in sufficient detail to allow
135 for a definitive comparison.

136 These observations only serve to show that the restrictions we find for ESP are in need of an
137 explanation, because they do not hold for past-and-counterfactual markers in other languages.
138 The problem has also been stated concisely by Schulz (2007: 178):

139 [...] English is not the only language showing non-temporal uses of its past tense marker. It
140 is rather a phenomenon that can be observed in languages from quite different families. But
141 while there is a certain similarity between the contexts in which these languages employ
142 this marker, there are also language specific differences. In order to account for the general
143 meaning of the simple past in English a proponent of the past-as-unreal [i. e. remoteness-
144 based] hypothesis has to give a description of this semantic property that singles out those
145 and only those uses made of ESP. This is clearly something notions like “distance from
146 reality” and “non-actuality” etc. cannot achieve.

147 The solution by Schulz (2007) is to give up on finding a single definition of ESP that accounts
148 both for its actual past and counterfactual references and treat it as an item that is ambiguous
149 between two different meanings.³

150 In this article, I pursue the goal of finding a definition that does account for both uses, while
151 simultaneously excluding non-attested readings.

152 Another fact that any theory of counterfactual conditionals has to account for is their very
153 counterfactuality. In brief, the pragmatically most salient feature of counterfactual clauses is
154 the inference that their prejacent is not true in the actual world:

- 155 (13) If Martha had watered the flowers, they would have survived.
156 ~> Martha didn't water the flowers, they did not survive.

157 This effect has long been acknowledged to be a cancelable implicature (cf. Stalnaker, 1975;
158 Adams, 1976; Barwise, 1986; Comrie, 1986; Kaufmann, 2005a; von Stechow, 2012). The following,
159 widely cited example comes from Anderson (1951):

- 160 (14) If Jones had taken arsenic, he would have shown just exactly those symptoms which he
161 does in fact show.

162 Regardless of examples such as (14), in most situations, counterfactual conditionals are infelici-
163 tious if their prejacent is known or very likely to be true (compare e. g. Starr 2014).

- 164 (15) Tracy ran the marathon.
165 #If Tracy had run, Sharlene would have run too.

166 Any approach to past-and-counterfactuality markers should be able to derive these felicity con-
167 ditions and the contrary-to-fact implicature.

168 Finally, an ideal approach to the semantics of ESP would allow for a straightforward deriva-
169 tion of the meaning of a sentence from the definitions of its lexemes and basic compositional
170 principles. The following list summarizes the observations that a theory of past-and-counterfactuality
171 marking should ideally account for the following:

³In the words of the author:

We assume that the morphological category of the simple past is ambiguous and expresses two different syntactic feature combinations: either it asks for the past tense operator *PAST* or for the mood operator *SUBJ*. If the simple past is interpreted as mood feature, then the verb also carries a [-pres] feature. Hence, the subjunctive obligatory combines with the present tense. A similar ambiguity is also proposed for the syntactic perfect. The auxiliary *have* is either interpreted as the perfect operator or selects for the counterfactual mood. In the second case it does not carry a tense feature like the simple past. The counterfactual mood is only realized if some other past tense marking in the sentence asks for the subjunctive mood. (Schulz, 2007: 205)

- 172 1. ESP can express:
173 (a) reference to the actual past (1-a);
174 (b) reference to the counterfactual future (1-b);
175 2. ESP can *not* express:
176 (a) reference to the possible future (4);
177 (b) reference to the counterfactual past (5);
178 3. EPP can express (among other things):
179 (a) reference to the counterfactual past (1-c);
180 (b) reference to the counterfactual future (6);
181 4. Counterfactual conditionals come with the implicature that their prejacent is not true in the
182 actual world (13) and are infelicitous in contexts where this implicature is in conflict with the
183 common ground (15).
184 5. Past-and-counterfactuality markers differ cross-linguistically in whether they can also refer
185 to domains such as the counterfactual past and possible future.
186 6. Sentence meanings should derive compositionally and transparently from basic definitions
187 and observable structures.
- 188 In the following section, I will argue that previous approaches to the relation between past
189 and counterfactuality face problems with various subsets of the above goals.

190 **3 The previous discourse on the connection between past and** 191 **counterfactuality**

192 The broad and varied literature on past-and-counterfactual markers can roughly be sorted into
193 two main approaches:

- 194 1. Expressions that encode both past and counterfactuality essentially express remoteness from
195 the actual present. (Remoteness approach)
196 2. In counterfactual contexts, the past marker causes a perspective shift to the past, from which
197 hypotheses about the future can be entertained. (Back-shifting approach)⁴

198 In this section, I will retrace the development of both and illustrate each with one represen-
199 tative example.

200 **3.1 The remoteness-based approaches**

201 The observation that the same expressions may be used to encode a reference to the past and
202 to counterfactual situations has puzzled generations of researchers. For English, early accounts
203 include Jespersen (1931), Joos (1964) and Langacker (1978). Accounts such as Seiler (1971), James
204 (1982), Dahl (1997), Lazard (1998), Iatridou (2000), Verstraete (2005), Verstraete (2006), Van Lin-
205 den & Verstraete (2008) and others have added a cross-linguistic perspective to this, confirming
206 that the connection between past and counterfactuality is not an accident of the English lan-
207 guage. Iatridou (2000) cites Papago (Hale, 1969), Proto-Uto-Aztecan (Steele, 1975), Japanese, and

⁴This distinction corresponds largely to the divide between the *modal remoteness line* and the *temporal remote-ness line* in Romero (2014); and to the distinction between *past-as-modal* (or *past-as-fake*) and *past-as-past* in Schulz (2007), Karawani (2014), Bjorkman (2015) and others.

208 Korean (Han, 1996; Cho, 1997) as examples of languages with past-and-counterfactuality mark-
209 ers, in addition to Hebrew, Turkish and Basque, going back to the studies by James (1982) and
210 Fleischman (1989). Van Linden & Verstraete (2008) additionally name Cantonese, Icarí Dargwa,
211 Fongbe, Gooniyandi, Hdi, Imbabura Quechua, Kham, Korean, Ma'di, Matses, Ndyuka, Slave,
212 Temiar, Wardaman and Yimas as languages in which past tense markers also appear in coun-
213 terfactual clauses.

214 In trying to explain this relation, most of the earlier accounts converge on some version of
215 the remoteness approach. As mentioned above, the main idea behind this approach is that past
216 and counterfactuality share a semantic core of *distance from the actual present*. In this section, I
217 will retrace the development of this line of reasoning and show how it overgenerates potential
218 readings of ESP.

219 The remoteness approach was intuited early by Joos (1964), Steele (1975) and Langacker
220 (1978), and spelled out in detail in Fleischman (1989): essentially, this approach suggests, both
221 the past and counterfactuality are removed from the actual present. Fleischman (1989) proposes
222 that the counterfactual interpretations of past markers are metaphorical extensions of their tem-
223 poral meanings (see also Isard, 1974; Lyons, 1977), and claims that the basic metaphor that links
224 tense and modality is *distance*. Under this approach, however, it is not clear why future events
225 and counterfactual past events should not be covered by the same form in some languages but
226 not in others. This overgeneration of potential interpretations has been noted and criticized
227 early on by Givón (1994: 317).

228 Iatridou (2000) picks up the essential intuition by Steele (1975) and Fleischman (1989) and
229 proposes to overcome the vagueness of previous proposals by formalizing a definition of ESP
230 that covers both its modal and its temporal uses in the form of the Exclusion Feature. The
231 Exclusion Feature is defined in terms of a variable x that can range either over times or over
232 worlds. It determines that an utterance may refer to the same *world* as the world of utterance,
233 but in this case, it cannot refer to the *time* of utterance. Or it can refer to the *time* of utterance,
234 but in this case, it cannot refer to the *world* of utterance.

235 While my proposal is very close in spirit and deeply indebted to Iatridou (2000), it is also
236 meant to overcome some of the problems it faces. I will discuss how Iatridou (2000) relates to
237 the following four observations from above:

- 238 (1b) ESP can express reference to the counterfactual future.
239 (2a) ESP can not express reference to the possible future;
240 (2b) ESP can not express reference to the counterfactual past;
241 (5) Past-and-counterfactuality markers differ cross-linguistically in whether they can also refer
242 to domains such as the counterfactual past and possible future.
243 (3b) EPP can express reference to the counterfactual future;

244 Iatridou (2000) does address observation (1b):

245 I will follow Palmer (1986), Vlach (1993), Kamp & Reyle (1983), and many others in treating
246 tense as only past or present and *woll* as modal. It follows, then, that [the topic time
247 excluding the utterance time] means that the topic time is in the past with respect to the
248 utterance time.

249 At first glance, it seems that this statement is successful in ruling out a reference of ESP to
250 the possible future. On second thought, however, the situation appears more complicated. The
251 following two stipulations are apparently expressed by the quoted passage:

- 252 (16) ESP can only affect a shift in worlds or times, but not both simultaneously.

253 (17) Future indices are not included in the world of reference.

254 The following additional assumption appears to be quite unavoidable:

255 (18) Future indices are temporally removed from the present/ not simultaneous with the
256 present.

257 Stipulation (16) would successfully rule out observation (2b). The combination of (16) and (17)
258 succeeds in ruling out reference to possible futures, in accordance with 2a. But if one accepts
259 (18), then the combination of these three hypotheses would also rule out a reference of ESP to
260 counterfactual futures and therefore contradict our very basic observation (1b).

261 The only way for Iatridou (2000) to be compatible with all the observations discussed here,
262 one would have to give up hypothesis (18). While this is generally a logical possibility, it is not
263 a very intuitive one and would need scrupulous exploration. Moreover, it is not clear under
264 the assumptions by Iatridou (2000) how we would accommodate the cross-linguistic variation
265 we find. The fact that ESP cannot refer to potential futures is not a general property of past-
266 and-counterfactuality markers cross-linguistically, and it is not clear to me how this observation
267 relates to the statement quoted above.

268 Later motivations for abandoning parts of Iatridou (2000)'s proposal come from observations
269 about counterfactuals with EPP and future reference as in (6), repeated below:

270 (6) Martha arrived in Paris yesterday. If she had arrived there TOMORROW, she would have
271 missed the *Fête de la Musique*.

272 According to Iatridou (2000)'s proposal, a counterfactual clause with a past perfect tense in the
273 protasis has two layers of past as in *If Martha **had arrived** earlier, she would have met Laura*; only
274 one of those layers can be interpreted as referencing a non-actual world. The second layer is then
275 necessarily taken to encode temporal distance from the present, resulting in a past reference.
276 Therefore, counterfactuals with a past perfect tense in the protasis should always refer to the
277 counterfactual past. Iatridou (2000: 252, footnote 26) states this as a puzzle that has to remain
278 unsolved under her initial proposal. It has later been taken up by Ogihara (2000), Ippolito (2003),
279 Arregui (2007), Ippolito (2013) and others. Later work in the remoteness-based tradition includes
280 Nevins (2002), Schlenker (2004), Karawani & Zeijlstra (2013) and Schulz (2014). They are however
281 not primarily concerned with deriving the distributional and interpretational restrictions we find
282 for ESP.

283 Before closing this section, I would like to point out that, despite the problems pointed
284 out above, Iatridou (2000) successfully addresses and derives the contrary-to-fact implicature
285 of counterfactual conditionals. We will see in the coming sections that this is not the case for
286 some later approaches.

287 3.2 The back-shifting approaches

288 Much of the subsequent work on ESP has moved away from a remoteness-based approach and
289 toward a back-shifting approach. Dudman (1983) and Dudman (1984) are often credited as the
290 first accounts of this line of reasoning. The central idea is that in combination with *would* in
291 the apodosis, a simple past marker causes a backward shift to a point in the past from which we
292 can quantify forward over possible developments – including those that are no longer accessible
293 from the present perspective.

294 This idea is illustrated by figure 1. It is independent from the choice between a parallel-
295 worlds framework (Romero, 2014) and a branching-time framework (Ippolito, 2013).

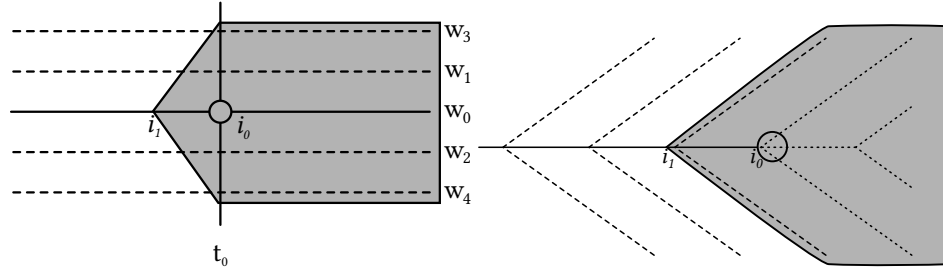


Figure 1: In back-shifting approaches, the past tense morphology is thought to push one's perspective back in time so that developments that are no longer possible become historically accessible. Left: parallel worlds; right: branching time;

296 Romero (2014: 48) has brought forward a point of criticism that generally applies to this line
 297 of reasoning:

298 According to the temporal remoteness [back-shifting] line, past tense morphology uni-
 299 formly expresses temporal precedence, but this morphology may be interpreted outside
 300 the syntactic structure where it is found, i. e., outside the if-clause in our case; it is this
 301 mismatch between surface position and interpretation site that deceptively gives the im-
 302 pression that the additional tense layer is fake (Dudman 1983, 1984, Arregui 2009, Grønn
 303 & von Stechow (2009); see also Ippolito 2003).

304 In other words, this line of reasoning relies on complex assumptions about the syntax-
 305 semantics interface and cannot derive the intended meaning from the surface structure. The
 306 main goal of Romero (2014) is to find a plausible solution to this problem, while maintaining the
 307 basic assumption about temporal back-shifting.

308 In addition to the apparent mismatch between form and meaning that is basic to back-
 309 shifting approaches, they also share the essential challenge faced by the remoteness-based ac-
 310 counts: They are either too loose or too restrictive to account for the full range of attested
 311 references of ESP and related markers from other languages.

312 One back-shifting approach that is very close in spirit to my proposal and also quite similar
 313 to it in its reliance on branching time is represented by Ippolito (2003, 2006, 2013). I will in
 314 particular take a closer look at Ippolito (2013) for the remainder of this section.

315 The approach by Ippolito (2013) is crucially motivated by the observation by Iatridou (2000)
 316 that counterfactuals with a past perfective in the antecedent can refer to the (counterfactual)
 317 future, as illustrated above in (6), which remains an unsolved puzzle under Iatridou (2000)'s ap-
 318 proach. The first one to pick up this puzzle was Ogihara (2000). Ippolito (2013) goes against
 319 Ogihara (2000) in asserting that this observation cannot be accounted for purely in terms of a
 320 contrastive focus on temporal adverbials. Ippolito (2013) does take into account the overgener-
 321 ation of readings that earlier approaches suffer from and that had previously been pointed out
 322 by Schulz (2007).

323 One potential problem that Ippolito (2013) addresses explicitly, in contrast, for example, to
 324 Romero (2014), is the missing counterfactual past reading for counterfactual conditionals with
 325 ESP in the protasis. Ippolito (2013) states that the past form in the protasis of the conditional
 326 is already used to shift back the time of historical accessibility. It cannot simultaneously determine
 327 the time during which the relevant event takes place. Why the past feature is spelled out on the
 328 main verb of the protasis remains an open question in this scenario. Also, this account does not
 329 sit too well with the observation that, in some languages, a single past marker can apparently

330 do both: shift back the point of accessibility and locate the time of the event described in the
 331 protasis in the past. So Ippolito (2013)'s explanation rests on idiosyncratic and language-specific
 332 assumptions about ESP. The same could be said about the solution that I offer myself, although
 333 in 3D modality, the relation between ESP and similar items from other languages that do not
 334 have the same restriction would be more straightforward to define.⁵

335 Ippolito (2013) also manages to exclude the use of counterfactual ESP and EPP in the protasis
 336 with *will* in the apodosis, by stipulating that *will* is just the spell-out of an abstract underlying
 337 form WOLL when in the scope of a present tense, but will be spelled-out as *would* when in the
 338 scope of a past tense (going back to Abusch 1988, also assumed by Iatridou 2000).

339 Ippolito (2013) does not provide a clear explanation for why counterfactual conditionals are
 340 often not felicitous in situations where indicative conditionals can be used. Consider (19):

- 341 (19) a. I'm quite sure that Amaya took the train.
 342 b. If she took / did take the train, she will arrive at 3pm.
 343 c. #If she had taken the train, she would arrive at 3pm.⁶

344 Ippolito (2013) accounts for why counterfactuals are felicitous in situations where indica-
 345 tive conditionals fail. And she offers an explanation for why EPP counterfactual conditionals
 346 are good in situations where ESP counterfactual conditionals fail. But she does not predict, or
 347 explain, the infelicity of counterfactuals in situations such as (15). In contrast to Iatridou (2000),
 348 Ippolito (2013)'s counterfactual conditionals are quantifications over both actual / possible and
 349 counterfactual indices – it is therefore not clear how the contrary-to-fact interpretation is de-
 350 rived. The closely related approach in Ippolito (2003) relies on *Maximize Presupposition* to derive
 351 the felicity conditions of counterfactuals, but Leahy (2018) points out two problems with this so-
 352 lution: Firstly, it cannot generate the contrary-to-fact implicature as new information; secondly,
 353 as earlier pointed out by Leahy & Romero (2010), "Ippolito's derivation seems not to enable the
 354 conclusion that the antecedent is false, but that the antecedent suffers presupposition failure."
 355 (Leahy, 2018: 9).

356 Finally, the criticism by Romero (2014) against the general intransparency of back-shifting
 357 approaches also applies to Ippolito (2013), who freely admits that her proposal rests on complex
 358 assumptions about the syntax-semantics interface and does not fully resolve all mismatches.

⁵To wit, compare the definition of ESP that I will suggest further on with a hypothetical past marker that behaves like ESP except that it also includes the counterfactual past:

- (i) $[[\text{ESP}]]^{c,g} = \lambda p \lambda i : i \in R_I, i \in \{\{i' | i' < i_c\} \cup \{i'' | t(i_c) \leq t(i''), i_c \not\leq i''\}\}.p(i)$
 (ii) $[[\text{PAST}_1]]^{c,g} = \lambda p \lambda i : i \in R_I, i \in \{\{i' | i' < i_c\} \cup \{i'' | i_c \not\leq i''\}\}.p(i)$

By contrast, saying that ESP can only shift back either the time of historical accessibility or the event time, but not both, while PAST₁ can do both, appears hard to formalize under the proposal by Ippolito (2013).

A reviewer points out that the missing interpretation of ESP could instead be derived by its paradigmatic contrast with EPP. In my view, the assumption of a blocking effect should be motivated by the observation that under specific circumstances, the missing interpretation is still available. But as far as I can tell, ESP can never refer to the counterfactual past. Of course, it still remains a logical possibility.

⁶Note that the relevant conditional here is the EPP conditional rather than the ESP version *If she took the train, she would arrive at 3pm*, because we assume that the hypothetical train-taking event is located in the past, and counterfactual ESP cannot refer to the past.

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3.3 Summary

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In this section, I have discussed previous approaches to the connection between past and counterfactuality and the meaning of ESP. I have then assessed two concrete proposals with respect to how well they can handle the observations in section 2.

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We have seen that Iatridou (2000) is a compositionally transparent, straightforward approach that accounts for both the observed reference to the actual past, and to the counterfactual present and future. By quantifying exclusively over counterfactual worlds, it also provides an explanation for the contrary-to-fact implicature. But it is not clear that it solves the problem of over-generating unattested references of ESP to the counterfactual past and the possible future; and it does not address the reference of EPP to the counterfactual future.

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On the other side of the spectrum, Ippolito (2013) successfully rules out unacceptable uses of ESP and EPP. However, this approach requires highly involved assumptions about the syntax-semantics interface, is not easily compatible with the cross-linguistic variation in past-and-counterfactual markers, and it does not fully predict the implicature that the prejacent of a counterfactual should be false in the actual world. Table 1 summarizes these differences between the two approaches with reference to the goals set in section 2.

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	1a	1b	1c	2a	2b	2c	3a	3b	4	5	6
Iatridou (2000)	+	+	+	+	?	?	+	-	+	-	+
Ippolito (2013)	+	+	+	+	+	+	+	+	-	-	-

Table 1: Observations covered by various approaches to the relation between past and counterfactuality; +/-: does/ does not adequately account for the corresponding observation.

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There are a number of other proposals that attempt a unified approach to the actual-past and counterfactual-present/-future uses of ESP, such as Grønn & von Stechow (2009), Karawani & Zeijlstra (2013), Karawani (2014) and Bjorkman (2015), to which I cannot do full justice in this paper. As far as I can assess, however, they all fall somewhere onto the spectrum between these two situations. My work is particularly indebted to Condoravdi (2002), which incorporates elements from the remoteness-based approaches as well as the back-shifting approaches – although it is not primarily concerned with ESP. I recommend Schulz (2007: 169ff) for a detailed discussion of Condoravdi (2002) and other proposals, where some of the same problems are diagnosed systematically. The proposal I will introduce in the coming sections is closer to the remoteness-based approaches of Iatridou (2000) and others than to the back-shifting approaches in that it will derive the various interpretations of ESP via its definition rather than through syntactic movement.

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Before concluding this section, I should comment on the role of aspect in expressing counterfactuality. Aspect has long been known to be deeply involved with modality (compare e. g. Dowty 1977 and references therein). A large body of literature addresses the interaction of the perfective / imperfective distinction and counterfactuality. This interaction appears to be more important for some languages such as Greek (Iatridou, 2000) and Romance (Hacquard, 2006, 2009) than for others such as Russian Grønn (2013). But for English, too, this distinction has been argued to play a crucial role in the expression of counterfactuality most prominently by Arregui (2005, 2007, 2009). Two central observations to this body of work are that, firstly, *would*-conditionals without EPP in the protasis are much worse in a context such as (20):

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(20) You: I asked you to look after my plants while I'm on vacation. But now you don't have to worry about them anymore. They died yesterday.

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398 B: I am sorry, but also a bit relieved. If your plants [had died next week]/ #[died next
399 week], I would have been very upset.⁷

400 Arregui concludes from this observation that the version without EPP is not counterfactual.
401 Secondly, the same does not apply to stative predicates, as illustrated by (21):

402 (21) Suppose you keep your plants in the kitchen cupboard, and worry because they are not
403 growing. I can see what is going wrong:

404 You: I am worried about my plants.

405 Me: Oh, they simply do not have enough light. If they **had** enough light, they would
406 be doing much better.

407 Arregui proposes that the relevant difference between the two cases is aspectual. Ippolito (2013)
408 argues that the difference is that in the case of (20), the presuppositions that are necessary for the
409 prejacent of the conditional are not true, while in (21), the prejacent itself is negated. The initial
410 account by Ogihara (2000) suggests that the relevant difference is in the focus on a temporal
411 adverbial in (20). My impression is that the only clear-cut cases where EPP is required to refer
412 to a counterfactual future involve both some event of dying and focus on a temporal adverbial,
413 so I find it hard to take a definitive stand in the debate on empirical grounds. I do however not
414 share the central assumption by Arregui that the ESP version of (20) is not counterfactual. And
415 my approach is compatible with Ippolito (2013)'s proposal that an EPP counterfactual is needed
416 when the presupposition of its prejacent is false in the actual world.

417 In Romance, Greek and some other languages, the perfectivity distinction plays a much
418 more obvious role in counterfactuals than it does in English. My proposal does not contradict
419 those findings. It just suggests that different languages might have developed different means to
420 accessing the counterfactual. English uses past tense, but other languages might require imper-
421 fective aspect in combination with past tense or other means. While a comprehensive review of
422 cross-linguistic strategies is beyond the scope of this paper, I will comment briefly on the appar-
423 ently wide-spread combination of imperfective aspect and past tense. I conceive of perfective
424 expressions as treating indices as atomic and zero-dimensional, and describing events as atomic
425 entities. Imperfective aspect, by contrast, treats indices as intervals; in effect, imperfective as-
426 pect creates a two-dimensional *smudge* from an index, which then covers both the modal and
427 the temporal dimension. So, in my mind, imperfective aspect can grant access to non-actual
428 worlds by smudging indices. This intuition is inspired heavily by Dowty (1977), who has spelled
429 this out in some detail. In those languages where the reference of past tense expressions does
430 not extend to counterfactual branches, the only way to access the counterfactual domain may
431 be to combine past tense with imperfective aspect. I will not be able to exhaustively argue for
432 this position here. This short excursion is just meant to illustrate that the 3D-modality approach
433 can in principle be extended to other phenomena and languages.

434 4 Assumptions

435 4.1 Branching time

436 Like Ippolito (2013), many linguists have used a branching-time framework to formalize the
437 relation between tense and modality (e. g. Condoravdi, 2002; Kaufmann, 2005b; Arregui, 2009;
438 Laca, 2012). In this section I will introduce the main ideas and explain how giving up one of the

⁷Slightly modified from Arregui (2007: 223).

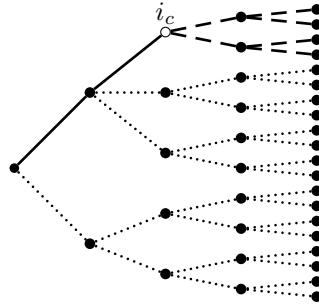


Figure 2: The three domains of the factual (solid line), the counterfactual (dotted lines) and the possible future (dashed lines). Vertically aligned indices are here taken to be simultaneous.

439 original assumptions by Thomason (1970) will allow us to come up with a definition of ESP that
 440 combines strengths of Iatridou (2000) with those of Ippolito (2013).

441 The original motivation behind the branching-time framework, as envisioned by Meredith &
 442 Prior (1956); Prior (1957, 1967) and spelled out by Thomason (1970, 1984), is a philosophical one.
 443 It is meant to account for puzzling intuitions about historical necessity. Going back to ancient
 444 Greek thinkers such as Aristotle and Diodorus of Chronos, the notion of historical necessity
 445 addresses the asymmetry between statements about the past and statements about the future.
 446 In brief, statements about the future have a certain chance of being true or false. By contrast,
 447 true statements about the past are true by necessity – according to Thomason (1970, 1984) and
 448 others.

449 This asymmetry is captured by a branching-time framework. The formal definition for this
 450 framework is taken from Thomason (1984). I recommend Rumberg (2016) for an overview of
 451 branching time in modal and temporal logic.

452 **Definition 1** A branching-time frame \mathfrak{A} is a pair $\langle I, < \rangle$, where

- 453 1. I is a non-empty set of indices i ;
 454 2. $<$ is an ordering on I such that if $i_1 < i$ and $i_2 < i$, then either $i_1 = i_2$, or $i_1 < i_2$, or $i_2 < i_1$.
 455 An index i_1 is called a **predecessor** of i_2 iff $i_1 < i_2$; it is a **successor** of i_2 iff $i_2 < i_1$

456 All indices have a common predecessor.

457 A branch through any $i \in I$ is a maximal linearly ordered subset of I containing i .

458 This partial ordering relation creates a tree structure as shown in figure 2.

459 It beautifully captures the intuition about historical necessity: Looking forward, there may
 460 always be more than one possible continuation. But looking backward, there is only one line of
 461 developments that leads to where we are now. Thomason (1970, 1984) relies on logical constants
 462 such as the necessity operator \Box instead of explicitly quantifying over indices with expressions
 463 such as $\forall i : \phi(i). \psi(i)$.

464 Therefore, to formalize the notion of historical necessity, he introduces the additional as-
 465 sumption that quantification over worlds is always restricted to those branches that are identical
 466 up to the present moment.

467 This is an assumption I do not make. In the set-up I propose here, actuality can be seen as a
 468 kind of necessity in that it can be formalized as a universal quantification – one that is restricted
 469 to the actual past and present. It is however not the only kind of necessity that can be modeled in

470 a branching-time framework. Universal quantification over both the actual and counterfactual
 471 worlds is also possible. So is universal quantification over only counterfactual worlds.

472 I should add that the notion of historical necessity as such can still be implemented. It is
 473 of course still possible to model the asymmetry between the openness of the future and the
 474 necessity of hindsight with the proposed system: Looking forward, there are potentially many
 475 continuations of the present and we cannot single out one “real” future. But looking back, we
 476 can still uniquely identify one sequence of indices that precedes our present as our actual past.
 477 Quantification over branches can still be explicitly restricted to those branches that pass through
 478 the actual present.

479 Giving up the quantificational restriction opens up a new semantic space that differs crucially
 480 from all previous accounts in that it allows for a tripartite distinction between temporal-
 481 modal domains. In a parallel-worlds approach, there is only a binary distinction between the actual
 482 worlds and non-actual worlds. In a Thomason-style branching-time approach, there is only
 483 a binary distinction between actuality and future possibilities. But in an approach to branching
 484 time that does not assume the same restrictions, there is a three-way distinction between the actual
 485 (past and present), the counterfactual (past, present and future) and the possible (future). To
 486 show this difference between traditional and unrestricted branching time more clearly, consider
 487 the following toy model, illustrated in figure 3. I have already outlined this model in von Prince
 488 (2018).

489 If we assume with Thomason (1970, 1984) that quantification is restricted to branches that
 490 are identical up to the actual present, then, if i_2 is the actual present, we can only quantify over
 491 b_3, b_4 .

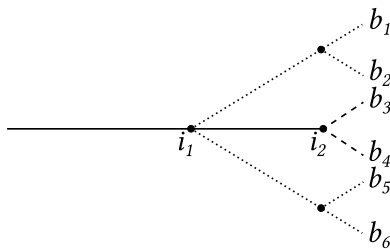


Figure 3: A toy model to illustrate the difference between restricted and unrestricted branching-time frames.

492 It is also possible to quantify over all six branches b_1, \dots, b_6 , if one shifts the perspective
 493 backwards to i_1 as in the back-shifting approaches that have been discussed above. However, it
 494 is not possible to quantify exclusively over b_1, b_2, b_5, b_6 , because from i_2 they are not accessible
 495 at all, and from the perspective of i_1 the precedence relation cannot distinguish them from b_3
 496 and b_4 .⁸

497 By giving up this restriction, we can distinguish between and exclusively quantify over three
 498 modal domains:⁹

- 499 1. i_c and predecessors of i_c (the actual);

⁸I would like to stress here that, by quantifying exclusively over counterfactual indices, we do not imply anything about the actual world. We only say about counterfactual branches that they have a certain property X ; we do *not* say, however, that only counterfactual branches have property X . If we only assert about counterfactual branches that they have a property X , we leave it open whether the actual world also has property X or not.

⁹By saying these are three *modal* domains, I mean that their distinction is afforded by the predecessor relation alone, without recourse to an additional temporal order.

- 500 2. successors of i_c (the possible);
 501 3. and indices that are neither successors nor predecessors of nor identical with i_c (the coun-
 502 terfactual);

503 In contrast to previous set-ups, this more fine-grained temporal-modal space allows for the
 504 more precise lexical definitions that we need to avoid the overgeneration of interpretations for
 505 ESP, and to account for the cross-linguistic variation, all the while maintaining Iatridou (2000)'s
 506 intuition about exclusive quantification over counterfactual worlds.

507 I also assume that indices from different branches can be sorted into groups of indices that
 508 qualify as simultaneous and that for any given pair of indices, it is possible to specify a temporal
 509 order between them. This means that only those branching-time structures that allow for a
 510 linear ordering of indices are candidates for the structure I assume (see also Schulz (2007) for
 511 similar concerns and Visser (2017) for a technical exploration of the problem).

- 512 **Definition 2** 1. Every index i has a time value $t(i)$.
 513 2. There is a strict linear order on time values, such that for every pair $t(i), t(i')$ either $t(i) = t(i')$
 514 or $t(i) < t(i')$ or $t(i') < t(i)$.
 515 3. For all i, i' if $i < i'$ then $t(i) < t(i')$.

516 In the following section, I will propose concrete definitions for some expressions of English.

517 4.2 Some TAM expressions of English

518 4.2.1 Definitions

519 I will show here how the assumptions in the previous section can be used for precise and simple
 520 definitions of English TAM expressions. I adopt the common assumption from tense semantics
 521 that the reference time of a sentence is represented as a temporal pronoun. TAM features place
 522 a presupposition on this temporal pronoun, as suggested by Partee (1973); Heim (1994); Abusch
 523 (1997); Kratzer (1998) and beautifully modeled in a recent paper by Bochnak (2016). Let us start
 524 with the definition of ESP.

- 525 (22) a. $[[\text{ESP}]^{c,g}] = \lambda p \lambda i : i \in R_I, i \in \{\{i' | i' < i_c\} \cup \{i'' | t(i_c) \leq t(i''), i_c \not\leq i''\}\}.p(i)$
 526 b. This will be abbreviated as : $\lambda p \lambda i : i \in I_{\text{ESP}}.p(i)$

527 In words: ESP takes a proposition and an index argument, asserts that the proposition is true
 528 for that index, under the condition that this index is a) relevant and b) either a predecessor
 529 of the actual present i_c ; or later than / simultaneous with i_c and not a successor of / identical
 530 with i_c . This definition accounts for the exclusion of ESP from reference to the possible future,
 531 the actual present and to the counterfactual past, simply by lexical definition. Since we can
 532 account for these restrictions on a lexical level, rather than an architectural level, in contrast
 533 to Ippolito (2013) and others, the cross-linguistic variation that we actually find with languages
 534 like Daakaka is fully expected.

535 Note that the definitions for English TAM expressions all include a variable of relevance
 536 for indices R_I and sometimes branches R_B . This variable has a number of functions, includ-
 537 ing ensuring the well-known non-monotonicity of counterfactuals. I assume with Stanley &
 538 Gendler Szabó (2000) that the domain of quantification is always restricted to contextually rel-
 539 evant items. I believe that R_B, R_i are determined dynamically and also include a measure of
 540 similarity to the actual world – worlds that differ from ours arbitrarily are not considered rele-
 541 vant. Thus, consider a scenario in which two speakers are locked in a room at the top of a high
 542 building and are contemplating ways to escape. One speaker may then say, felicitously:

543 (23) If we jumped out of the window, we would die from the fall.

544 In this scenario, we understand that they do not consider all logically possible worlds, including
 545 those in which gravity is extremely weak, or in which guardian angels are bound to pluck them
 546 out of the air.

547 By contrast, imagine the speakers are contemplating what they would do if they had super-
 548 powers such as flying. In this case, the utterance of (23) would seem weird, because we would
 549 evaluate the sentence relative to the counterfactual worlds already under consideration, which
 550 include superpowers.

551 At this point I would like to address the concern of one reviewer about the compatibility of
 552 this framework with traditional approaches to modal flavors and ordering sources. It is generally
 553 easily possible to intersect the domain of quantification over indices with those indices that are
 554 epistemically or otherwise accessible and to order branches or indices according to the number
 555 of propositions that are compatible with a given set of rules, wishes or similar. In this respect,
 556 the framework proposed here is fully commensurate with most traditional approaches to modal
 557 semantics.¹⁰

558 Turning to the meaning of further expressions of English, I stipulate that the definition of
 559 *would* is as follows:

- 560 (24) a. $\llbracket \text{would} \rrbracket^{c,g} = \lambda p. \forall b \in R_B. \exists i : i \in b, i \in R_I, i \in \{i' | t(i_c) \leq t(i'), i_c \not\leq i'\}. p(i)$ ¹¹
 561 b. Abbreviated as: $\lambda p \forall b \in R_B. \exists i : i \in b, i \in I_{\text{WOULD}}. p(i)$

562 When you compare this definition of *would* with the definition of ESP above, you will find
 563 that it is almost identical, except that a) *would* cannot refer to the actual past; and b) *would*
 564 contains a universal quantifier over branches. This last property ensures that *would* is excluded
 565 in the protasis of a counterfactual clause. As we will see shortly, *if* requires a proposition of
 566 type $\langle s, t \rangle$ as its first argument, and a proposition of type t as its second argument. Since *would*
 567 yields type t , it is not eligible for the protasis of a conditional clause. The only TAM element
 568 of English that can then step in to refer to counterfactual indices is ESP.¹² The range of both

¹⁰ Depending on the particular assumptions of a given framework, R_B could, for example, be intersected with the set of epistemically accessible branches. Or it could be either intersected with, or replaced by a selection function f , which, for any proposition ϕ and any relevant notion of similarity \approx , yields those branches that are modally closest to the branches B_0 passing through i_0 :

- (i) $f_{\approx B_0}(\phi)(b)$

Instead of writing, for example $\{b | b \in R, \exists i \in b. \phi(i)\}$ for the protasis of a conditional, we might refer to $\{b | f_{\approx B_0}(\phi)(b)\}$ (compare derivations below). I assume that intersecting R_B with the result of $f_{\approx B_0}(\phi)(b)$ would generally yield a subset of the latter. The details of the implementation would, of course, depend on the intended goals and the assumptions of the corresponding framework. The part about my proposal that interestingly differs from others here takes place in how ϕ is spelled out, not in how R_B, R_i are spelled out.

¹¹ I assume that the variable of relevance R_B results from an intersection of contextually relevant branches with the temporal-modal domain of the expression it occurs in, to the extent that this is necessary to avoid vacuously false statements.

¹² One option to derive the difference between varieties of English that allow *would* in the protasis of a conditional and those that do not, would be to assume two different entries of *would* that differ in their semantic type. As we will see below, I assume that *if* takes an expression of type $\langle s, t \rangle$ as its first argument, and an expression of type t as its second. An $\langle s, t \rangle$ version of *would* is given below:

- (i) $\llbracket \text{would} \rrbracket^{c,g} = \lambda p \lambda i : i \in R_I, i \in \{i' | t(i_c) \leq t(i'), i_c \not\leq i'\}. p(i')$

The corresponding t -type version would be derived by existential closure, which I assume, in the context of

expressions is illustrated in figure 4.

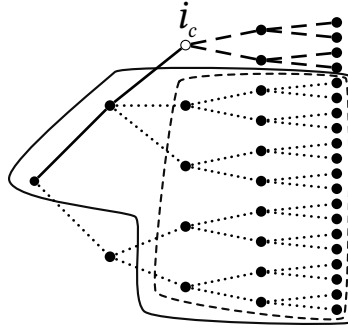


Figure 4: Modal-temporal domains in a branching-time structure. Solid frame: ESP; dashed frame: English *would*. Vertically aligned indices are assumed to have identical time values.

570 We will see below how these assumptions allow us to understand why the counterfactual
571 meaning of ESP is only available in combination with certain expressions like *would* or *wish*.

572 For the perfect, I suggest a definition in the tradition of Reichenbach (1947), Klein (1994) and
573 others, because it is the easiest to integrate to the framework developed here. A Reichenbachian
574 definition of perfect is given below:

$$575 \quad (25) \quad \llbracket \text{PERFECT} \rrbracket^{c,g} = \lambda p \lambda i : i \in R_I. \exists i' : i' < i. p(i')$$

576 This definition of the perfect aspect ensures that the event time is prior to the reference time.

577 Whether a Reichenbachian approach to perfect can successfully derive all its attested in-
578 terpretations, especially in the context of English present perfect, is a matter of current debate
579 (Grønn & von Stechow, to appear). Other approaches view the perfect as indicating that the
580 *result-state* of an event holds at present (Kamp & Reyle, 1983), or suggest that the perfect creates
581 and *extended now*, such that the present moment is made into an interval that includes prior
582 moments (Dowty, 1979). It is not my intention to decide between these different approaches.
583 The only effect of the perfect that is relevant for the discussion at hand is its potential to specify
584 that an event has taken place prior to the reference time (or prior to the end of the reference in-
585 terval). This is implied by all three lines of approaches to the perfect. The definition in (25) does
586 not require any additional assumptions on my part and is therefore the most trivial to integrate
587 into this framework. In contrast to Iatridou (2000) and Ippolito (2013), I therefore do not treat
588 the past perfect as instantiating two layers of past tense, but as a transparent combination of
589 perfect, which is here treated as a relative tense, and past tense.

590 The final ingredient that we need before we can demonstrate a derivation of the meaning of
591 a counterfactual conditional is English *if*.

592 Apart from the assumption that *if* is semantically vacuous (e. g. Kratzer, 1991) and others,
593 there are two basic intuitions about its meaning. One intuition has been explored, among others,
594 by von Stechow (1997, 1999a, 2001) and von Stechow & Iatridou (2002). In the terms of the proposed
595 framework, this intuition says that *if* takes two sets of branches and asserts that one set of
596 branches is a subset of another set of branches:¹³

597 (26) The meaning of *if* (first version):

indices, comes with a default universal quantification over branches.

¹³This simple picture holds at least as long as we leave out modal auxiliaries such as *might* and quantifying adverbials such as *usually* and *never*.

598 $\llbracket \text{if} \rrbracket = \lambda p_{\langle s,t \rangle} \lambda q_{\langle s,t \rangle} . B_p \subseteq B_q$, where $B_\phi = \{b | b \in R_B, \exists i \in b. \phi(i)\}$ – the set of those
 599 contextually relevant branches that contain an index for which ϕ is true.

600 Another intuition is that the antecedent of a conditional clause is a topic. Haiman (1978) was
 601 the first to note that conditionals are marked like topics in a number of typologically unrelated
 602 languages (also compare Iatridou, 2013: sec 4). Biscuit conditionals such as *if you're hungry,*
 603 *there's biscuits in the pantry* have been fruitfully analyzed as involving a topical *if*-clause –
 604 Hinterwimmer *et al.* (2008) argue that the same analysis can also be applied to indicative con-
 605 ditionals more generally. In my approach, a topic-version of *if* has to have a different set-up
 606 from the definition in (26). Crucially, it is a function that takes only one argument of type $\langle s, t \rangle$
 607 and one argument of type t rather than two arguments of type $\langle s, t \rangle$. Furthermore, the topi-
 608 cal *if* is an information-structural function. I will define it using the conventions of structured
 609 propositions, where $\langle \alpha, \beta \rangle$ is an ordered set such that α is the topic and β is the comment of
 610 an utterance (Krifka, 2001). Structured propositions have been used to model a wide variety of
 611 phenomena, including question-answer pairs and negation, as illustrated below:

612 (27) Q: Who read *Wolf Hall*? $\langle \lambda x. \text{read}(x)(\text{WH}), \{x | x \in R_x, \text{person}(x)\} \rangle$
 613 A: EZRA_F read *Wolf Hall*. $\langle \lambda x. \text{read}(x)(\text{WH}), \text{ezra} \rangle$

614 (28) The king of France is not bald. $\langle \iota x. \text{KoF}(x), \lambda y. \neg \text{bald}(y) \rangle$

615 In assertions of English such as (27) or (28), the topic and comment part can usually be combined
 616 via predicate application to form a full proposition. The suggestion I will make for conditionals
 617 is more reminiscent of frame-setting topics such as in the following examples from Mandarin
 618 Chinese and English respectively:

619 (29) *dà-xíng yú wǒ zuì xǐhuān niányú.*
 large-scale fish 1SG most like catfish
 620 “As far as large fish are concerned, catfish is my favorite.”

621 (30) In the middle ages, monks drank a lot of beer. (cf. Frey, 2013)

622 In (29), the frame topic *large fish* explicitly restricts the scope of the following proposition – the
 623 speaker does not commit to catfish being their favorite thing in the world, but only to preferring
 624 catfish over other big fish. This meaning can be represented as in (31):

625 (31) $\langle \{x | \text{big.fish}(x)\}, \forall y : \text{favorite}(\text{I})(y). \text{catfish}(y) \rangle$

626 For conditional clauses, I suggest the following logical form:

627 (32) The meaning of *if* (second and final version)
 628 $\llbracket \text{if} \rrbracket = \lambda p_{\langle s,t \rangle} \lambda q_t . \langle B_p, q \rangle$, where $B_\phi = \{b | b \in R_B, \exists i \in b. \phi(i)\}$.
 629 Here, q is a proposition of type t as in $\forall b \in R_B. \exists i. q(i)$ or $\exists b \in R_B. \exists i. q(i)$.
 630 Read: Within the set of relevant branches such that p is true, all / some branches contain
 631 an index such that q is true.

632 This definition is truth-conditionally identical to (26). The two definitions only differ in how
 633 *if* combines with the rest of the clause. I choose the second version here, because only this
 634 one allows me to make sure *would* is excluded from the protasis of a conditional in standard
 635 varieties of English. This approach is also better equipped to handle modal auxiliaries such
 636 as *might* in the apodosis, where, in the simplest scenario, the universal quantifier of *would* is
 637 replaced by an existential one. Note also that *if* does not do a lot of work here. It makes the

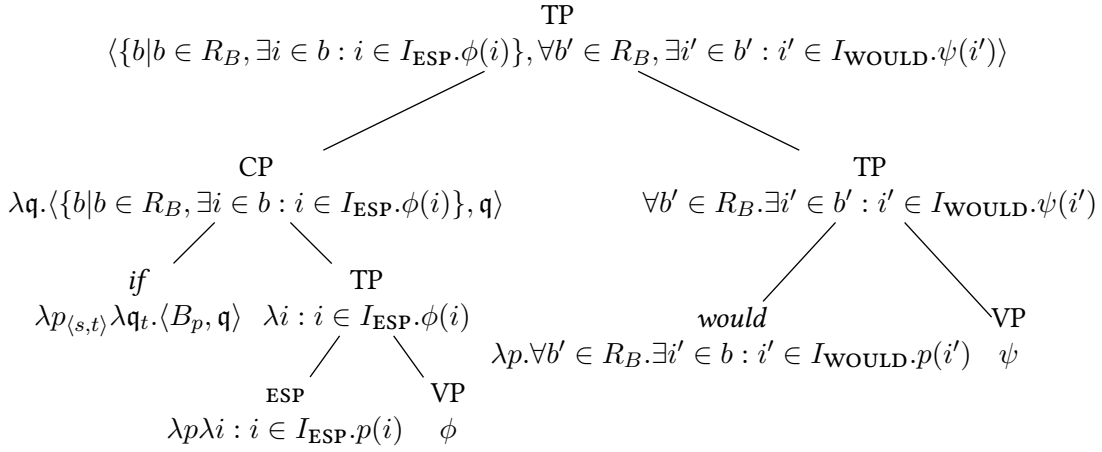


Figure 5: The syntactic representation and derivation of a counterfactual conditional

638 relation between two clauses specific, but the topic-comment relation it spells out is one that can
639 very frequently be found between juxtaposed clauses. It might therefore not be too surprising
640 that the same meaning can also be expressed without *if* as in *Had Laura taken the train, she*
641 *would have arrived on time*. This would seem to dovetail nicely with the approach by Iatridou
642 & Embick (1994) on inverse conditionals. In some languages, including Mandarin Chinese, no
643 specific complementizer or word order is needed to express a conditional clause (Comrie, 1986).
644 This, too, is not unexpected under the assumption that the job of *if* is a fairly light one.

645 4.3 Derivations

646 With these definitions in place, we can proceed to derive the meaning of a counterfactual con-
647 ditional. The syntactic representation is given in figure 5. The syntactic labels are merely meant
648 for better orientation and do not constitute a commitment to a particular set of assumptions
649 about syntactic structures. My only commitment is to the structural relations between nodes.
650 In each step, meanings combine via Functional Application as defined in Kratzer & Heim (1998).

651 Let us apply these definitions and derivations to a concrete example.

- 652 (33) (A heavy rainstorm is sweeping through the city.) If Margo went outside (now/ in the
653 near future), she would get soaked.

654 According to my assumptions so far, this sentence is true if all the relevant branches containing
655 a counterfactual present or future index where Margo goes outside also contain a counterfactual
656 present or future index where she gets soaked. The toy model in figure 6 shows a scenario
657 in which the sentence would be true: All ψ branches are also ϕ branches. Remember that it is
658 part of the apodosis ψ that the indices we are talking about are counterfactual. Therefore, there
659 can be no ψ indices that are successors of the actual present i_c (assuming that ψ includes the
660 specification that it is a property of counterfactual indices).

661 The assumptions I have made so far account for the observations stated in section 2: They
662 explain why ESP can refer to the actual past, to the counterfactual present and future; why it
663 cannot express reference to the actual or possible present, to the possible future or the counter-
664 factual past; I will say more about the contrary-to-fact implicature below in this section and in
665 section 6.

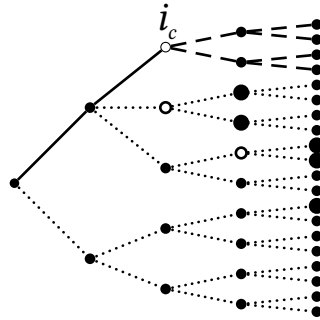


Figure 6: A toy model for a counterfactual clause such as (33); big circles: indices where the protasis is true $\phi(i')$; big solid dots: indices where the apodosis is true $\psi(i)$;

666 Note that there are several instances of the variable R_B in the tree above. It is legitimate to
 667 ask whether R_B is determined by both parts of the conditional separately and then somehow
 668 combined, or whether only one set of relevant branches is determined for the entire conditional
 669 sentence. Intuitively, I would assume that R_B is determined only once per sentence and fed into
 670 the derivation by whatever mechanism one prefers for quantifier-domain restrictors in general.
 671 The example is analogous to a case such as *Among the students who consistently did their home-*
 672 *work, everyone got a high score.* Here, it is clear that both *the students* and *everyone* will probably
 673 not refer to all the students on the planet. Depending on the context, the speaker will only
 674 be talking about the students in her latest semantics class, for example. It seems intuitive that
 675 the scope of both *the students* and *everyone* is subject to the same discourse-level restriction.
 676 Accordingly, I suggest that R_B , too, is determined for the entire sentence.

677 Before concluding this section, I will present the derivation of a counterfactual clause with
 678 EPP in the protasis and highlight the way in which it contrasts with counterfactuals that only
 679 have a simple past form in the protasis.

680 As stated above, EPP ensures that the event index is a predecessor of the reference index.
 681 In a counterfactual conditional, the reference index is in the counterfactual present or future. A
 682 predecessor of a counterfactual future index may itself be in the actual past. So let me sketch
 683 very briefly why conditional sentences with *would have* do not refer to the actual past. The entire
 684 sentence either has to be about only actual or possible indices, or only about counterfactual ones.
 685 In expressing an indicative conditional about the past, *would have* competes with ESP. And since
 686 ESP is the morphologically and compositionally simplest way to express a reference to the actual
 687 past, this interpretation is not available for *would have*.

688 The perfect aspect thus opens up the domain of past counterfactual indices, so we can talk
 689 about what would have happened in the past under specific circumstances. But what about
 690 Ogihara cases? We saw above in example (6) that EPP can express a reference to the future as
 691 well as to the past. This is one of the problems Iatridou (2000) has stated for her own account.
 692 It is easy to see, however, that the definitions and assumptions made so far are fully compatible
 693 with Ogihara cases. The truth conditions of an EPP counterfactual merely state that there is
 694 some index i in the counterfactual future, prior to which there is another index i' at which the
 695 event in question takes place. An index i' that is prior to a future index i may itself still be in
 696 the future. It does not have to be in the past. Figure 7 shows the derivation of a counterfactual
 697 conditional with EPP.

698 To conclude, I have introduced basic assumptions and definitions in this section and demon-
 699 strated how they allow us to derive the meaning of a counterfactual conditional clause without

700 any covert morphology, semantically empty elements or any complex movements between the
701 overt syntactic form and the logical form. We have seen in this section that the assumptions
702 made so far correctly account for the range of meanings we actually find for ESP and EPP – and
703 that they also correctly exclude the uses that are ungrammatical (compare section 3.3).

704 In the following two sections, I will explore further implications for the truth and felicity of
705 counterfactual clauses.

706 5 Truth conditions of counterfactuals

707 The truth conditions of counterfactual clauses have been a hotly debated topic for many decades.
708 There are two extreme positions that comprise the spectrum of opinions. One position asserts
709 that conditionals, counterfactual or not, do not have truth values at all. Thus, von Stechow (2011)
710 quotes Adams (1965), Gibbard (1981) and Edgington (1986) as prominent representatives of this
711 stance. As von Stechow (2011) notes further, this position has had no noticeable impact on the
712 linguistic side of the debate. Most linguists share the intuition brought forward by Lewis (1973)
713 that conditionals, counterfactual or indicative, have definite truth conditions that can, at least
714 sometimes, be tested in the actual world.

715 As Lewis (1981) puts it in the opening paragraph:

716 Consider the counterfactual conditional “If I were to look in my pocket for a penny, I would
717 find one”. Is it true? That depends on the factual background against which it is evaluated.
718 Perhaps I have a penny in my pocket. [...] So in this case the counterfactual is true.

719 Of course, probably everyone also agrees that for most counterfactual conditionals, the mat-
720 ter of their truth is usually not as straightforward as it seems in the above case. The following
721 classical example is attributed to Quine by Lewis (1973):

722 (34) If Caesar had been in command [in Korea] he would have used the atom bomb.

723 (35) If Caesar had been in command [in Korea] he would have used catapults.

724 Taken by itself, each assertion appears reasonable enough, even though we will hardly find a
725 scenario believable in which Caesar uses both the atom bomb and catapults in the same war.
726 This observation speaks to the deep-seated vagueness of counterfactuals and their general de-
727 feasibility. Approaches to counterfactual conditionals in the Kratzer-Lewis tradition therefore
728 operate with the notion of similarity: worlds are ranked according to how similar they are to
729 the actual world; different conditionals may activate different similarity rankings against which
730 they are evaluated. In sum, the view of truth conditions in the Kratzer-Lewis tradition and be-
731 yond is that 1) there are definite truth conditions that can sometimes be tested in the actual
732 world, but 2) they are vague and context-dependent.

733 Between those two extremes of the spectrum – no truth conditions vs. vague truth condi-
734 tions that can sometimes be tested in the actual world – my approach takes a middle ground. My
735 assumptions so far predict that counterfactual conditionals do have vague truth conditions, but
736 that these can never be tested exhaustively in the actual world. Because counterfactual state-
737 ments are statements about counterfactual indices, no actual index can make them true or false.
738 In other words, a counterfactual conditional can be true even if (the prejacent of) its protasis
739 is true and (the prejacent of) its apodosis is false in the actual world. And it can be false even
740 if both are true in the actual world. Applied to Lewis’ penny, the clause *If I were to look in my*
741 *pocket, I would find a penny* is not necessarily false if my pocket is empty. In this case, it is just
742 either false, or entirely irrelevant. This means that, if the speaker utters the *penny* conditional,

743 and the addressee checks her pockets and finds them empty, the speaker then has to either ad-
744 mit that she lied; or she has to qualify her statement, by saying, for example *Sorry, I meant if I*
745 *had magical pockets that always contain pennies, THEN, if you were to look, you'd find a penny.*
746 In most contexts, the listener would have no way of guessing the part about magical pockets.
747 Thus, the speaker may be able to deny a blatant lie, but then the conditional utterance would
748 still come across as highly misleading and uncooperative.

749 Since my position here is not entirely trivial, I will go into more detail about this point here.
750 I take it that in (36), B's utterance is a valid objection to A's statement.

751 (36) *A and B talk about Laura's arrival yesterday. They discuss whether the best option, given*
752 *that Laura had to arrive at 2:30, would have been the 10 am train, the 12 o'clock flight or*
753 *the bus at 9:30 am.*

754 A: If Laura had taken the train, she would have arrived at 2 pm.

755 B: That's not true. Laura did take the train, but she arrived only at 3 pm.

756 My claim is that B's objection is pragmatically valid, but not a direct counterargument against
757 the truth of the counterfactual conditional. Instead, it is a contradiction against a very strong
758 pragmatic implicature. This implicature is that the relation between propositions that we claim
759 to hold in counterfactual worlds should also hold in the actual world – other counterfactual
760 worlds should be considered irrelevant and therefore be excluded from the domain of quantifi-
761 cation. In other words, the counterfactual conditional implicates the indicative conditional. I
762 would like to briefly defend the idea that an objection of the form *that's not true* can in fact be
763 a contradiction to an implicature only, rather than the original statement by considering the
764 following two example conversations:

765 (37) A: If Laura had taken today's 8 o'clock train from Frankfurt, she would have arrived
766 in Berlin at 2 pm.

767 B: That's not true. MARTHA took that exact train and she arrived only at 3 pm.

768 (38) A: If you had taken melatonin before your flight to Boston last week, you would not
769 have been jet-lagged.

770 B: That's not true. I took some melatonin before flying to New York last year, but I
771 still had a terrible jet-lag.

772 In both cases, we may feel that B has made a valid argument against A's claim, despite the fact
773 that it is very clear that B's statement does not refute directly the truth of A's statement: In (37) A
774 didn't make any claim about Martha's time of arrival, only about Laura's. So A would of course
775 be justified to respond to B saying *I didn't say anything about Martha, so how can you say I'm*
776 *wrong?* but this would pragmatically only be licensed if A could plausibly motivate a claim that
777 two people can take the exact same train and still arrive at the same station at different times.
778 Otherwise, the assumption that Laura should arrive at the same time as Martha is enough to
779 make B's utterance a valid counterargument to A's claim. A similar case can be made for (38).

780 I suggest that what happens in (36) is analogous to what happens in (37) and (38): B actually
781 only objects to a strong implicature of A's statement, but we accept this objection as a valid
782 contradiction to A's statement as long as A cannot plausibly motivate why the implicature is
783 not valid. Now, these observations about the defeasibility of counterfactuals are by no means
784 new and should not be too controversial. They can be handled by a variety of approaches,
785 including Kratzerian situation semantics (Kratzer, 2015). The Kratzerian situation-semantics
786 approach theoretically differs in its truth conditions from the 3D-modality approach, in that a
787 counterfactual is definitely false if the antecedent is true and the consequent is false in the actual

788 world. But since it affords speakers great flexibility in choosing the set of worlds they quantify
789 over, it makes the same empirical predictions about acceptable linguistic behavior as I do.

790 6 Felicity conditions

791 Any account of counterfactual conditionals has to address their contrary-to-fact implicature,
792 including those cases where it fails to occur. I will start this section with some basic observations
793 about the felicity of counterfactual conditionals. There is a wide consensus that both indicative
794 and counterfactual conditionals are odd in contexts in which the prejacent of the protasis is
795 known to be true.

796 (39) *A asks when Laura will arrive. B knows for a fact that Laura has taken the train.*

797 B: #If she took the train, she will be here by noon.

798 B: #If she had taken the train, she would be here by noon.

799 Moreover, indicative conditionals are also bad in environments where the prejacent of the pro-
800 tasis is known to be false. But in this environment, counterfactuals are particularly good.

801 (40) Laura didn't take the train.

802 a. #If she took the train, she will be here by noon.

803 b. If she had taken the train, she would be here by noon.

804 The most detailed discussions of the felicity conditions of counterfactual conditionals concern
805 the contrast between indicatives and counterfactuals illustrated in (40). The main line of investi-
806 gation follows the intuition by Stalnaker (1975) that counterfactual, but not indicative condition-
807 als, require the revision of the context set of worlds, that is, the set of worlds that is compatible
808 with what we know in the actual world. Representative studies in this tradition are Asher &
809 McCready (2007) and Starr (2014). The proposal by Ippolito (2013) aims at deriving the revised
810 set of worlds through the back-shifting process triggered by past morphology.

811 In this section, I want to sketch out how the above two observations follow from my previous
812 assumptions in combination with some general considerations about principles of conversation,
813 before turning to the contrary-to-fact implicature and Anderson conditionals. In contrast to the
814 studies cited above, I do not assume a process of revisions in the context set of worlds. I suggest
815 that, in most contexts, the Question Under Discussion (QUD, see Groenendijk & Roelofsen 2009)
816 is about actual indices or future possibilities rather than counterfactual developments. In other
817 words, most of the time we want to know what actually happened rather than what *would* have
818 happened under certain circumstances. Therefore, in most contexts, by uttering a counterfactual
819 conditional, we violate the maxim of relation by not really answering the QUD. This violation
820 creates inferences. I assume that in most cases, we use conditional sentences to assert a positive
821 correlation between two propositions p and q (compare DeRose & Grandy, 1999). If both p and
822 q are true, we can simply say *p is true and q is true (because of p)*, and in most contexts, this
823 is the most informative and relevant information we can give. If we do not know whether p
824 is true, we may say *if p is true then q is true*. But if we are fairly certain that p is not true,
825 then the only option left is to talk about counterfactual indices by saying *if p were true, then*
826 *q would be true*: I assume with many others (including the seminal tradition of Kratzer 1991),
827 that an indicative conditional is trivially true if the protasis is false in the actual world. So when
828 we believe the protasis to be false in the actual world, putting it into an indicative conditional
829 would be uncooperative and infelicitous in most situations.

830 In a context where the QUD is concerned with what actually happened, the counterfactual

831 conditional is thus the least informative way to assert a positive correlation between two propo-
832 sitions. The inference is then that the other two, more informative, options are not available. In
833 most situations the most plausible reason is that *p* cannot be asserted because we do not believe
834 it to be true, and that the indicative conditional would be vacuous.¹⁴ We thus derive the imp-
835 licature that the prejacent of the protasis of a counterfactual conditional be false in the actual
836 world – the very fact that has led to the term *counterfactual*. We may summarize this argument
837 as follows:

838 (41) When the QUD is about actual indices, the following ranking reflects the preferred type
839 of sentence:

840 unconditional assertion > indicative conditional > counterfactual conditional

841 I therefore see a counterfactual clause in most contexts as an answer to a different question
842 from the QUD, but one that is still close enough to the actual question to be deemed relevant.
843 This is similar but not identical to the reasoning by Iatridou (2000), who sees a counterfactual
844 utterance as a *partial* answer to a question, rather than as an answer to a *different* question.
845 Iatridou (2000: 247) discusses the following conversation:

846 (42) A: What do you think about Peter and Ian?

847 B: Well, I like Ian.

848 The implicature is that B cannot simply assert the same degree of fondness for Peter as for Ian.
849 Iatridou (2000) states that this implicature is of the same nature as the counterfactual implicature.

850 The set of assumptions I make also ensures that the implicature of falsity in the actual world is
851 context-dependent. For example, there are contexts where QUD is about counterfactual indices.
852 In this context, no implicature arises:

853 (43) A: What would YOU have done if the professor had caught you cheating?

854 B: If I had been caught cheating, I would have admitted my mistake and done penance.
855 In fact, I was caught once and admitted my mistake and have never cheated again.

856 Furthermore, there may be situations in which the QUD is about actual indices, but an uncon-
857 ditional assertion is not possible because of epistemic uncertainty, and indicative conditional
858 would be vacuously true because we know its apodosis to be true (rather than the protasis to be
859 false). In this scenario, too, we do not expect a counterfactual implicature. And that is exactly
860 what happens in an Anderson-conditional. The *locus classicus* to show that falsity in the actual
861 world is a cancelable implicature by Anderson (1951: 37) has been introduced in section 2 and is
862 repeated below:

863 (14) If Jones had taken arsenic, he would have shown just exactly those symptoms which he
864 does in fact show.

865 If this was uttered by a doctor trying to diagnose Jones' cause of death, we would infer that
866 arsenic poisoning is in fact a likely option. Without giving a complete analysis of this case, I
867 would like to outline briefly how I think about it:

868 Again, we imagine a context for (14) in which the QUD is roughly *what is the cause of Jones'*
869 *death?* – a question about actual indices. Talking about counterfactual indices instead is a vio-
870 lation of the maxim of relation. This creates inferences – the immediate inference that is created

¹⁴There are of course cases in which vacuously true indicative conditionals are used. See section 7.2 for a brief discussion.

871 is that, for some reason, both the corresponding indicative conditional and the corresponding
872 unconditional assertions are not felicitous in this context. One possible reason for that, as we
873 have seen before, is that the protasis is not true in the actual world.

874 However, in this scenario, there is a different explanation. The unconditional assertion –
875 *Jones took arsenic, that's why he shows the symptoms we observe* – is presumably not available,
876 because the doctor lacks the degree of confidence that would be necessary for this strong com-
877 mitment. In situations of epistemic uncertainty, an indicative conditional is often a good choice.
878 But consider the indicative conditional *If Jones took arsenic, he shows exactly those symptoms*
879 *which he shows*. Following standard approaches to indicative conditionals, this assertion would
880 be vacuously true. Of course, Jones shows the symptoms he shows, regardless of the cause. And
881 this is how the counterfactual clause is licensed in this situation. Like in other scenarios, an un-
882 conditional proposition cannot be asserted and the indicative conditional would be vacuously
883 true – but in this special case, it is vacuous because we know that the apodosis is true in the
884 actual world, rather than that the protasis is false, thereby leading to a different interpretation.
885 This reasoning closely follows the proposal by von Fintel (1999b).

886 At this point, I would like to briefly discuss Mackay (2015)'s work, which points out that
887 Anderson-conditionals are problematic at least for Iatridou (2000) and for Schulz (2014) because
888 of the following problem: According to both approaches, counterfactual clauses exclude not
889 only the actual world from their domain of quantification, but also worlds that are epistemically
890 indistinguishable from the actual world. When we utter a counterfactual conditional, we speak
891 only about those worlds that differ from ours in ways we would notice. But under this assump-
892 tion, a sentence such as *If Jones had taken arsenic, everything would be exactly as it is*, cannot be
893 true, because in those counterfactual worlds we are quantifying over, not everything can be as
894 it is in the actual world.

895 I do not share the assumption, which is quite central to the entire Kratzer-Lewis tradition,
896 that we cannot single out the actual world. It is true that, were we presented with a set of worlds
897 that are epistemically indistinguishable, we would not be able to identify which of those worlds
898 is ours. But this is not the only way in which we can identify something. We can identify objects
899 in terms of what we know about them. But we can also identify them in terms of our relation
900 to them. We can always point to where we are and refer to it as *here*, even if we do not know
901 anything more about the place we inhabit. Likewise, we can always point to the actual world as
902 the world we currently experience, even though it may be indistinguishable to us from an infinite
903 number of different worlds. In other words, what we do when we exchange information is not
904 trying to narrow down which of the epistemically accessible worlds is ours. Instead, we point to
905 the world we inhabit and ask what it is like. The difference will be too subtle for most purposes
906 to be of significance. But with respect to some issues, there are profound consequences. Mackay
907 (2015)'s problem is one of them. In sum: I believe that when we quantify over counterfactual
908 worlds, we can include those that differ only imperceptibly from ours. So Jones can have the
909 exact same symptoms in a counterfactual world that we notice in the actual one.

910 Concluding this section, I have suggested that the contrary-to-fact implicature of counter-
911 factual clauses in most contexts derives from a mismatch with the QUD and therefore a violation
912 of the maxim of relation. I suggest that, under a QUD that is about actual indices, counterfac-
913 tual conditionals compete with indicative conditionals and unconditional assertions. So when
914 a counterfactual conditional violates the maxim of relation, listeners have to figure out why
915 the other two structures are unavailable, and depending on the situation, different explanations
916 may be available. This approach correctly predicts that counterfactual clauses are licensed by a
917 variety of contexts and that only some of them lead to the implicature that the prejacent of the
918 conditional protasis be false in the actual world.

7 Perspectives

At this point, I am done with the main goals of this paper: I have stated the problems I wanted to tackle, proposed a set of assumptions and showed how they solve my problems. You may now wonder why something as seemingly obvious should not have been previously proposed and discussed. Unfortunately, a full reconstruction of the history of modal and temporal logic in the light of this question goes far beyond the constraints of this paper. But I will, in the following section, trace the application of branching time to counterfactuality other than Ippolito (2003, 2006, 2013) for some historical context. In section 7.2, I will offer a few reflections on the implications of conceptualizing counterfactuality as a property of indices, rather than as a property of untensed propositions.

7.1 Looking back: branching time and counterfactuality

In section 3, I have reviewed the literature on the connection between counterfactuality and past. I have therein not included a small body of literature that does not address this connection, but does apply a branching-time framework to counterfactual conditionals. In this section, I would like to take a look at this discourse and briefly discuss how my work relates to it.

Crucially my suggestion to lift Thomason (1970, 1984)'s restriction on quantification has never been made. I will give a brief outline of approaches to get a better sense of why this is. The three main attempts to get a better handle on counterfactuals with the help of branching time that I am aware of all come from the tradition of modal logic. They are:

1. Thomason & Gupta (1980);
2. Tedeschi (1981), building on a manuscript later published as Cresswell (1985);
3. and Placek & Müller (2007).

All three articles are concerned with narrowing down truth conditions for counterfactuals: Thomason & Gupta (1980) reflect on the usefulness of branching time in defining similarity between worlds. Tedeschi (1981) ponders the relative scope of modal-temporal operators and argues that, among the following formalizations, (44-a) should be the correct logical form of a counterfactual conditional:¹⁵

- (44) a. $PW\phi \rightarrow PW\psi$
b. $PW(\phi \rightarrow \psi)$
c. $P(W\phi \rightarrow W\psi)$

Placek & Müller (2007) start with the observation that a unified analysis of all counterfactual clauses apparently has to remain quite vague. They propose to give up a unified and vague analysis in favor of a split analysis that allows to define rigorous truth conditions for at least a subclass of counterfactuals, which they call *historical counterfactuals*.

Historical counterfactuals are characterized by the fact that their antecedent is true in some historical alternative to the actual world. There was a distinct point in time such that histories split into those where the antecedent is true and those where it is not true. For illustration, consider the following pair of sentences:

(45) *If this coin had shown heads, I would have won my bet.*

(46) *If this were a ruby, it would be red.*

¹⁵ P is a past operator and W is a future operator.

959 Example (45) is a historical counterfactual; (46) is not, because there is no moment in the past
960 such that histories (or worlds) split into those where the object of interest is suddenly a ruby
961 and those where it is not. The main intuition is that historical counterfactuals have clear and
962 rigorous truth conditions. Thus, in a scenario where *A* bets on heads, *B* tosses a coin and it
963 comes up tails, the counterfactual in (46) should simply evaluate as true, without any degree of
964 vagueness or ambiguity.

965 In sum, applying branching time to counterfactual conditionals has mostly been consid-
966 ered as a tool to narrow down truth conditions, rather than finding the most parsimonious and
967 compositionally most transparent definition of TAM expressions. Giving up the restriction on
968 quantification introduced by Thomason (1984) only helps with the latter, but is actually detri-
969 mental to the former: I do not assume any logical constants and therefore do not provide any
970 validities for my framework. While it is theoretically possible to recast my assumptions using
971 logical constants instead of explicitly restricted quantifiers, I do not think it would be a very
972 fruitful exercise. Moreover, the way I envision the branching-time frame, it does little to help
973 narrow down the notion of similarity. I assume that it is possible to jump from the actual present
974 directly to a development that might branch off from a slightly earlier moment, but where magic
975 is suddenly possible, or kangaroos do not have tails, or something that is an emerald in the actual
976 world is a ruby. The tree of developments does not represent a quantum-mechanical state-space,
977 but the world and its alternatives as we imagine them. The difference between historical coun-
978 terfactuals such as (45) and other conditionals such as (46) might still be possible to model if one
979 restricts the domain of quantification to completely realistic branches, that is, those branches
980 where our laws of nature and social conventions are identical.

981 7.2 Looking forward: Rethinking counterfactuality

982 The discourse on counterfactual clauses has been riddled by confusion about the relation be-
983 tween linguistic form and meaning. Edgington (2007: 131f.) gives a lucid overview of the debate.
984 So does von Stechow (2012), who writes:

985 Conditionals of the first kind are usually called “indicative” conditionals, while conditionals
986 of the second kind are called “subjunctive” or “counterfactual” conditionals. The “indica-
987 tive” vs. “subjunctive” terminology suggests that the distinction is based in grammatical
988 mood, while the term “counterfactual” suggests that the second kind deals with a contrary-
989 to-fact assumption. Neither terminology is entirely accurate.

990 Accordingly, there is widespread disagreement about which clauses in fact qualify as coun-
991 terfactual. In this section, I will outline how my approach answers some of the most contested
992 questions of classification. These are:

- 993 1. Are there future counterfactuals?
- 994 2. Are questions such as *would you like some tea?* counterfactual?
- 995 3. Are *when / if hell freezes over*-conditionals counterfactual?

996 7.2.1 Future counterfactuals

997 Everyone agrees that *If Laura had taken the train, she would have been on time* is a counterfactual
998 conditional. But opinions differ on whether (47) also counts as counterfactual.

999 (47) If Laura took the train, she would be on time.

1000 Sentences like these are similar to counterfactual conditionals of the past in that they often imply
1001 that we do not expect the protasis to come true. Compare:

1002 (48) ?If Laura took the train, and I'm quite sure she will, she would be on time.

1003 However, some authors are uncomfortable with describing them as counterfactual indices be-
1004 cause they do not exactly imply that the protasis be false in the actual world, since there is no
1005 such thing as “the actual future” (compare also Karawani, 2014: 4).

1006 Iatridou (2000: 135) refers to conditionals such as (47) as *future-less-vivid* (FLV) conditionals,
1007 and concludes that they should be treated on a par with past and present counterfactuals.

1008 The definitions I have given so far lead to the same conclusion as Iatridou (2000): the expres-
1009 sion *would* quantifies exclusively over counterfactual indices.

1010 Recall from section 4.1 that the future is split into two domains: One set of future devel-
1011 opments is a continuation of the actual present. The other set of future developments are not
1012 accessible from the actual present, they are continuations of prior actual indices.

1013 The sentence in (47) is a counterfactual sentence because it is a sentence about counterfactual
1014 (future) indices. These can be defined as follows:

1015 (49) counterfactual future indices: $\{i|i_0 \not\leq i, t(i_0) < t(i)\}$

1016 We also have a solution for the conundrum cited above: There is no actual future. But there is
1017 a counterfactual future – these are indices that are temporally later than the actual present but
1018 not successors of it. The fact that we often consider the prejacent of a future counterfactual con-
1019 ditional to be unlikely to come true follows again from our expectation that most QUDs about
1020 the future are about what *will* happen, not what *would* happen. In those contexts, the coun-
1021 terfactual conditional competes with the indicative conditional. Choosing it over the indicative
1022 creates inferences – in many contexts, the implicature is one of unexpectedness.

1023 7.2.2 Counterfactual questions

1024 Not much of the literature concerns itself with “counterfactual morphology” in questions.¹⁶ Kim
1025 (2016) has remarked on the puzzling asymmetry between assertions and questions as illustrated
1026 in (50):

1027 (50) You could pass me the salt.

1028 (51) Could you pass me the salt?

1029 The assertion in (50) suggests that the addressee is not very likely to pass the salt. But the
1030 corresponding question in no way suggests the same thing – quite on the contrary, by uttering
1031 it, the speaker communicates an expectation that the addressee will in fact pass the salt.

1032 As I have outlined above in section 6, the implicature of a counterfactual conditional that a
1033 proposition be false in the actual world comes from a mismatch with the QUD. The listener has
1034 to figure out why the corresponding indicative and unconditional assertion were not available
1035 instead. One plausible explanation in many situations is that the protasis of the counterfactual is
1036 (likely to be) false in the actual world. For some questions, the same calculations and inferences
1037 may arise as well. A counterfactual question may be used in a context where the QUD is about
1038 actual indices, to narrow down possible answers. For example, let us assume we are trying to
1039 find out when Laura arrived. We know that she considered using the 9-o'clock train but ended
1040 up traveling by car. We may then ask:

¹⁶This terminology has been used, among others, by Matthewson & Truckenbrodt (2017).

1041 (52) If she had taken the 9-o'clock train, when would she have arrived?

1042 Someone who just enters the room will infer from this question that we do not think Laura took
1043 the train. However, in a polite question such as (51) and (53), corresponding inferences do not
1044 arise:

1045 (53) Would you open the window, please?

1046 According to my definitions, (53) is a counterfactual question. It is a question about counterfac-
1047 tual indices: In the relevant counterfactual future indices, do you open the window? Again, in
1048 most situations we will be more concerned with what *will* happen next than with what *would*
1049 happen next. So the listener once again has to figure out why the speaker did not use *will* in-
1050 stead of *would*. In a situation where the question does in fact constitute a polite request, though,
1051 we may suspect that the reference to counterfactual indices is meant to give us a painless way
1052 out of a commitment. In effect, this is a question we can truthfully answer positively, even if
1053 we are not in a position to follow the request:

1054 (54) I would (gladly), but the windows here cannot be opened.

1055 7.2.3 Contrary-to-fact indicatives

1056 Ippolito (2013: 2) specifies that she uses the term *counterfactuals* only with reference to sub-
1057 junctive conditionals whose antecedents are false. She thereby explicitly excludes indicative
1058 conditionals whose antecedents are known to be false, as in (55):¹⁷

1059 (55) If you are Santa Claus, I am the Easter Bunny.

1060 Even so, Ippolito (2013) does describe conditionals such as (55) as counterfactual. According to
1061 the definition of counterfactuality proposed here, (55) is not a counterfactual conditional, despite
1062 its contrary-to-fact implicature. Here is how I think about it: If we both agree that I am not the
1063 Easter Bunny, the only way this utterance can be true is to say that the protasis is false. In a
1064 situation where the protasis has already been suggested to be true by someone else, violating
1065 the constraint against vacuously true statements can be a creative way to refuse this suggestion.

1066 Like a counterfactual conditional, a sentence such as (55) implicates that its protasis is false
1067 by violating a communicative principle. However, the way this happens is different: (55)-type
1068 sentences are vacuous; by contrast, counterfactual conditionals do, in many contexts, not di-
1069 rectly address the QUD. The conditional in (55) is not about counterfactual indices. It is therefore
1070 not a counterfactual conditional.

1071 On the other hand, examples like Anderson (1951)'s arsenic example in (14) are not cat-
1072 egorized as counterfactual by Ippolito (2013), because they do not come with the implicature
1073 that their protasis be false in the actual world. By contrast, my definitions imply that they are
1074 counterfactual conditionals – again, because they are about counterfactual indices.

1075 In sum, if we understand counterfactuality as a property of indices – and of propositions
1076 about counterfactual indices – we can classify utterances regardless of the variable circum-
1077 stances of their utterance context and specific interpretation.

¹⁷Compare (Franke, 2009: 266) for a brief discussion.

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8 Conclusion

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The task I have set myself in this article was to find a definition of ESP that would allow to arrive all the interpretations it can actually get and prevent the derivation of unavailable interpretations. I have first stated the main observations that describe the scope of the investigated phenomena and presented examples of past-and-counterfactuality markers from other languages that stress that accounting for unattested readings of ESP is not trivial.

I have then outlined the history of approaches to past-and-counterfactuality markers and identified two major lines of investigation – remoteness-based and back-shifting. Among the former, I have singled out the seminal work by Iatridou (2000) and have shown that, while it is very straightforward, compositionally transparent and explanatory with regards to the contrary-to-fact implicature of counterfactual conditionals, it does not fully predict the available range of distributions and interpretations.

Among the back-shifting approaches, I have discussed Ippolito (2013) as a representative contestant. Ippolito (2013) does a good job in covering attested and unattested interpretations and distributions, but does not predict the observed cross-linguistic variation and may not suffice to explain the contrary-to-fact implicature. It also relies on complex assumptions about the syntax-semantics interface.

I have proposed to solve these problems by combining Iatridou (2000)’s exclusive quantification over counterfactual worlds with Ippolito (2013)’s ideas about the role of branching-time, resulting in a tripartite modal-temporal structure. I have discussed the predicted truth-conditions of this approach and shown how the felicity conditions and implicatures can be derived from my assumptions. I have then given an outline of the history of approaches to branching time and counterfactuality and argued that my approach has never before been discussed, because without my focus on linguistic parsimony, compositional transparency and cross-linguistic variation, the advantages are not immediately obvious. Thus, I have argued that in languages such as Daakaka, the “distal” past marker is also used for both the actual past and for counterfactual contexts, like English, but unlike English, it can also be used with reference to the counterfactual past. This illustrates that the inability of ESP to refer to the counterfactual past, along with its other restrictions, are not trivial and need an explanation that can accommodate the observed cross-linguistic variation.

Finally, I have discussed the new understanding of counterfactuality that arises from the theory I have proposed here. I believe that my assumptions have much more far-reaching consequences than can be explored here and am looking forward to discussing them in the future.

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