Any theory of counterfactual conditionals needs to first explain what a conditional is. At its core a conditional is a specific kind of relationship between two propositions, the antecedent and the consequent. The form and meaning of a conditional are entirely separate, but the form is easy to describe.

1) If Bob eats cake frequently, then he must like cake.
2) Stop or I'll shoot you.
3) Build a better mousetrap and the world will beat a path to your door.

Most conditionals contain an "if ... then" construction. Conditional constructions may exceptionally use conjunctions such as "and" or "or" to express a relationship between an antecedent and a consequent. All of these constructions broadly mean that under conditions in which the antecedent is true, the consequent is also true. The precise formal semantics of such conditionals are a matter of some debate, since conditionals can have effects on the surrounding discourse and thus cannot be analyzed one sentence at a time satisfactorily. We must analyze sequences of sentences because certain orders are invalid and others are not.

Counterfactual conditionals have an additional component to their meaning. The antecedent is believed to be highly improbable or in fact false. Iatridou (2000) claims that “counterfactuality is used as a term only with respect to situations that cannot be helped anymore”. In some languages the falsity of the antecedent is an implicature, meaning that
information appearing later in the discourse may contradict it. In other languages the falsity of the antecedent is presupposed and cannot be contradicted later. English is the former type of language. 

(4) If I won the contest, my check should be in the mailbox now. 

(5) If I had won the contest, my check would have been in the mailbox by now. 

(4) and (5) make similar claims about the world, although in (5) the speaker believes she did not win the contest. (4) does not comment on the speaker’s beliefs. This implicature may be cancelled by later content in the discourse. For instance, in example (6) the English gloss is a felicitous discourse, although the Chinese example is not. In other languages, the falsity of the antecedent is presupposed. This means that later elements of the discourse may not contradict the falsity of the antecedent. Regardless of the status of the antecedent, both types of counterfactuals share a family resemblance, but interact with the rest of the discourse differently. 

(6) Yaobushi ta meiyou fengzhen tade pifu shang hui you bao 
If-not-that she have-not measles, her skin surface will have bumps 
If she didn’t have the measles, her skin would have bumps on it. 

#Qishi, yinwei tade pifu shang xianzai you zheiyang de bao, ta haoxiang you fengzhen 
#Actually, because her skin surface now has those-kind of bumps, she appears have measles 
#Actually, because her skin has those sort of bumps on it, she appears to have the measles. 

Example due to Nevins (2002), lack of overt tense marking leads to non-cancellability of antecedent, hence confirming its status as a presupposition. Since Chinese lacks any overt tense marking, we can hypothesize that it lacks a way to distinguish counterfactual and indicative conditionals. I aim to refute this null hypothesize through semantic probes and the existence of a dedicated complementizer which demonstrate conclusively that Chinese does have the ability to express counterfactual conditionals. Their differences from English forms are predictable from the lack of tense marking (Nevins 2002). I also show through translations of English sentences
and native speaker judgments of acceptability that Chinese is fully capable of expressing counterfactual statements and that equivalent sequences of statements containing counterfactuals (e.g. syllogisms and contrapositives) have the same truth conditions in both languages.

I devote considerable attention to the formal semantics of counterfactual conditionals in order to explain why the semantic probes work the way they do and why they distinguish counterfactual and indicative conditionals. I will be adopting the framework of Gillies (2007), which features concentric spheres of possible worlds that are gradiently accessible from the topic world. Gillies provides a formal explanation for how the context domain (set of possible worlds) changes as new sentences are added to the discourse.

**English Syntax**

We begin our investigation with the syntax of English counterfactual wishes. In particular, we note the appearance of past tense even though the situation describes a situation occurring in the present, or the appearance of the past perfect to describe a past situation.

(14) I wish I had a donut.
(15) I wish I had had a donut yesterday.

(14) expresses a desire about the present and (15) expresses a desire about the past, yet the embedded clauses do not appear in the logically expected tense. Iatridou goes into great detail explaining the appearance of this past morpheme in counterfactual contexts. The past morpheme, in both its functions, serves to exclude an actual situation. The ExclF feature can exclude the present time from the discourse, resulting in a past tense or it can exclude the present world, resulting in a counterfactual conditional (Iatridou 246).
In English, Modern Greek, Hindi and other Indo-European languages, we see the occurrence of fake tense/aspect/mood morphology in counterfactual conditionals but not in indicative conditionals (Iatridou 2000:268). In English, this ExclF(w) feature is realized as past tense, with multiple instances of the past tense resulting in the past perfect.

(16) If I have a dollar in my pocket, I will give it to you.

(17) If I had a dollar in my pocket, I would give it to you.

(16) is an indicative conditional and (17) is a counterfactual conditional, and the difference in meaning is clear. (16) can only reasonably be uttered if I am ignorant of the contents of my pocket. It can be assigned truth conditions in a straightforward manner if we interpret it as a statement about the future or a verifiable hypothesis. Iatridou labels this construction the “future neutral vivid”. (17) is less straightforward. It, too, is a statement about the present time or future time, but it implies that I either do not have a dollar in my pocket or that the probability is so low it is not worth considering. Iatridou labels as the present counterfactual (PresCF) or future less vivid (FLV) depending on the temporal coordinates of the event. She analyzes “would” as the co-occurrence of “will” with the ExclF(w) feature.

We can also get multiple instances of the past tense from both the ExclF(t) and ExclF(w) features.

(18) If I had robbed a liquor store, I would be in jail right now.

(18) is located both in the past and in a non-actual world. Iatridou’s analysis suggests that temporal expressions (and thus time itself) can be meaningfully compared across possible worlds and hence are rigid destinations (Iatridou 252). Having time behave in such a way is useful to our model since conditionals with antecedents occurring in the future behave differently from those located in the present or past.
The Future Less Vivid receives the exclusionary marker although the exact semantics of a ‘non-actual’ future are unclear. In a PresCF or a PastCF, probability does not explicitly enter the semantics since we are talking about events that already either certainly happened or did not happen. It is not entirely surprising that the ExclF(w) feature might have slightly different meanings in different environments. We see different behavior in wishes than we do in counterfactual conditionals due to their semantic content, so an FLV could either be contrary to a (likely) future event or a separate interpretation of exclusionary morphology. Iatridou admits that the inconsistency of wishes and FLV with PresCFs and PastCFs is a weakness in her analysis but does not propose an alternative.

One convincing reason for grouping ExclF(w) and ExclF(t) together in the first place is their similar behavior with respect to implicatures (implicated content of a sentence). Consider the following sequence

(19) Thomas was drunk on Tuesday.
(20) In fact, he still is.

If (20) had not been uttered after (19), we would assume that Thomas is not drunk anymore. We can do something similar with counterfactual conditionals.

(21) If the patient had lupus, he would have a butterfly-shaped rash. He does in fact have a butterfly-shaped rash and the doctors have already ruled out other illnesses, therefore he has lupus.

Counterfactual wishes, however, must actually be counterfactual. Counterfactuality is presupposed in wishes and the speaker cannot cancel this presupposition later in the discourse, as demonstrated in the following example.

(22) #I wish I lived in California. In fact, I do.
The unacceptability of this example, though, is accounted for by the subject-oriented nature of *wish*. This is a different environment than a counterfactual conditional. The counterfactuality is with respect to the speaker’s beliefs rather than the real world.

(23) Bob wishes he were Canadian. In fact, he was born in Toronto and then adopted by Americans, so he’s actually Canadian.

Iatridou notes that these sorts of sentences are exceptional and that “possibly they should make us suspect that the only true counterfactual environment is the counterfactual conditional”. Exclusionary past morphemes nevertheless contribute to the semantics of such sentences since they are interpreted as contrary to fact.

Aside from syntax, conditionals have properties that require us to step outside classical logic in order to predict their occurrence and native speaker grammaticality judgments. The truth of an indicative conditional does not depend solely on the truth or falsity of its antecedent and its consequent.

(24) #If 2=3, then the moon is made of green cheese.

In logic, this statement is of course true, and yet it *doesn’t feel true*. The indicative conditional construction cannot encode all logically true propositions. Intuitively though, it is hard to decide whether this conditional is false or whether we should simply not assign it a truth value and reject it as ill-formed. It is clear, then, that the *if...then* construction even in its most basic form has content over and above its use as a logical connective. Various ad-hoc repairs are possible to rule out vacuously true or nonsensical conditionals and give a theory of indicative conditionals, but any complete theory should also account for the ways in which counterfactual conditionals fail to adhere to expected logical properties. I claim that Gillies’ (2007) theory of
counterfactual conditionals accounts for this phenomenon precisely, explained in depth in the formal semantics section.

One of the most dramatic examples of counterfactuals exhibiting strange behavior is the failure of the contrapositive. The contrapositive is valid in classical logic, $P \implies Q$ and $\neg Q \implies \neg P$ are equivalent. This is true for indicative conditionals as well, even if the meaning is more restrictive than a straight logical reading.

(25) Failure of Counterfactual Contraposition (Von Fintel 1999)

(Even) If Goethe hadn’t died in 1832, he would still be dead now.

#If Goethe were alive now, he would have died in 1832.

The indicative conditional does not show this sort of paradoxical behavior, since the indicative equivalent of the first sentence *If Goethe did not die in 1832, he is dead now* is not true. Two further properties lead us to posit a radically different semantics for counterfactual conditionals. The first of which is the failure of the syllogism.

(26) Failure of Counterfactual Syllogism (Von Fintel 1999)

If Hoover had been a communist, he would have been a traitor.

If Hoover had been born in Russia, he would have been a communist.

#If Hoover had been born in Russia, he would have been a traitor.

(27) Example Indicative Syllogism

If Bob is human, then he is mortal.

If Bob is an accountant, then he is human.

If Bob is an accountant, then he is mortal.
The first two sentences seem to be talking about very different situations. The former describes a non-actual Hoover with a different political affiliation and the latter changes his place of birth. It is not clear that we’re talking about the same entity in both cases.

(27) Failure of Strengthening the Antecedent / Thinning (Due to Lewis, repeated in Von Fintel)
If Kangaroos had no tails, they would topple over.
#If Kangaroos had no tails but used crutches, they would topple over.

(28) Indicative Strengthening the Antecedent
If Bob is an accountant, then he is employed.
If Bob is an accountant and lives in Virginia, then he is employed.

This somewhat humorous example also shows how counterfactual conditionals defy our expectations from logic. If a subset of possible worlds with tailless kangaroos fails to exhibit a certain property, then we shouldn’t be able to state that the whole set of tailless kangaroos worlds exhibits this property. However, when the first sentence of (28) is uttered in isolation, kangaroos using crutches is not a salient possibility is and thus is not even considered.

Counterfactual conditionals exhibit other bizarre properties. They have effects on the discourse and have received significant attention in theoretical literature. We have an example below of the canonical Sobel sequence.

(29) Sobel sequence (due to Lewis 1973, repeated in Gillies 2007)
If Sophie had gone to the Parade, she would have seen Pedro dance.
But of course, if Sophie had gone to the parade and been stuck behind someone tall, she would not have seen Pedro dance.

The sequence seems unremarkable, but we can get a completely infelicitous reading by reordering the sentences.
(30) Reverse Sobel Sequence (Gillies 2007)

If Sophie had gone to the Parade and been stuck behind someone tall, she would not have seen Pedro dance.

#But of course, if Sophie had gone to the parade, she would have seen Pedro dance.

Gillie’s analysis involves a topic domain: a set of possible worlds, and an accessibility metric which can be thought of a sequence of concentric spheres of possible worlds. In order to interpret a sentence, it is necessary to expand the set of possible worlds to accommodate the antecedent. In other words, we pick the smallest concentric sphere that intersects the antecedent domain (set of possible worlds in which the antecedent is true). In the generalized Sobel sequence, would(p, q) but of course would(p and r, not q). The set of p-worlds is a subset of the (p and r)-worlds. Therefore, we have a discursive mechanism for explaining the infelicity of the Reverse Sobel Sequence.

(31) Repaired Reverse Sobel Sequence

If Sophie had gone to the Parade and been stuck behind someone tall, she would not have seen Pedro dance.

But of course, if Sophie had gone to the parade and had her view not been obstructed, she would have seen Pedro dance.

By explicitly including a component of the antecedent that is inconsistent with “Sophie had been stuck behind someone tall”. We can produce a Sobel sequence whose reverse is also acceptable since the antecedents do not overlap at all. Nevertheless without such intervention, only one order is possible. We also get Hegel sequences, which involve “might” and further counterfactuals.

(32) Hegel sequence
If Hans had come to the party he would have had fun; but, of course
if Hans had come to the party, he might have run into Anna and they would have had a huge
fight, and that would not have been any fun at all.

Permuting the order results in nonsense.

(33)Reverse Hegel Sequence

If Hans had come to the party, he might have run into Anna and they would have had a huge
fight, and that would not have been any fun at all; but, of course
# if Hans had come to the party, he would have had fun

Chinese Syntax

We begin our discussion of the syntax of Chinese conditionals with a summary of
Chierchia (2000)’s findings about quantification and different types of Chinese conditionals. In
Gillies (2007)’s semantics of counterfactual conditionals, we explicitly quantify over possible
worlds, so a discussion of how Chinese conditionals pick up their quantificational force is
important for incorporating counterfactual conditionals into a larger picture of how Chinese
behaves.

Chierchia (2000) gives a lexical functional account of three different types of Chinese
conditionals—a bare conditional, a ruguo conditional, and a dou conditional—and gives
examples of each. The following three examples are taken from Chierchia’s “Chinese
Conditionals and the Theory of Conditionals” from a section of the article which summarizes
findings of Cheng and Huang (1996).
(34) Bare conditional
shei xian jinlai, wo xian da shei
who first enters, I first hit who
“If X enters first I hit first”

(35) Ruguo conditional
Ruguo ni kandao shei, qing jiao ta lai jian wo
If you see who, please tell him come see me
“If you see someone, please ask him to come see me”

(36) Dou conditional
Bulun ni jiao shei jin-lai, wo dou jian ta
Regardless you ask who come-in, I all see him
“Regardless of who you ask to come in, I will likewise see him/her”

All three types of conditionals can have a universal reading, but for an existential reading a ruguo conditional is required. Bare conditionals have wh-words in both the antecedent and the consequent, whereas in the other types of conditionals they are confined to the antecedent. Wh-words, in fact, refer to a new entity / are indefinite in the antecedent of all conditionals, but must refer to an already stated entity in the consequent (Chierchia 2000:17).

Chierchia devotes substantial effort to producing a convincing account of indefinite NPs and where they pick up their quantificational force. In Chinese, wh-words can appear in questions, or can co-occur with ruguo or a quantificational adverb. Thus we can account for their distribution by claiming that the wh-words are existentially quantified by default, but can be quantified in other ways due to the appearance of an adverb or context (Chierchia 2000:35-38).
In bare conditionals, question words must match exactly if they are to co-refer. Having equivalent meanings is insufficient.

(37) In bare conditionals, question words must match.
*ni xihuan shei, wo jiu piping shenme ren
You like who, I then criticize what person
‘If you like X, I will criticize X.’

So Chierchia’s analysis covers various properties of bindings of conditionals in Chinese, but does not concern the meaning of counterfactual conditionals, since analyzing straightforward indicative conditionals poses challenges of its own.

Bare and dou conditionals are useful for expressing generic statements about the world, but ruguo is the only conditional construction so far described that seems capable of producing a counterfactual reading, even though none are given in Chierchia’s article. It turns out that there are more options available in Chinese.

Nevins (2002) “Counterfactuality without past tense” describes a special-purpose complementizer that can form counterfactual conditionals, yaobushi. Yaobushi is in some ways “backwards” from English counterfactuals in that it asserts the truth of the antecedent rather than the falsity.

(38) Yaobushi example from Nevins
Yaobushi ta he le neige duyao, ta jiu bu hui si le
If-not-that he drank perf that-CL posion, he then not will die perf
If he hadn’t drank the poison, he wouldn’t have died.

However, yaobushi conditionals are not used in all cases when a counterfactual conditional would be in English.
One should note the lack of tense marking in (38). *Hui* contributes modal information to the meaning of (38), but does not locate the utterance in time and, crucially, does not suggest counterfactuality on its own the same way that *would* would in English. Indeed, this lack of an exclusionary operator results in a peculiar characteristic of this construction.

The unnamed man in (38) definitely drank the poison in the Chinese example, although this is a cancellable implicature in English. This difference has been attributed to the lack of exclusionary morphology and fake past tense in Chinese. Nevins surveys a number of languages including Hebrew, Turkish, Tagalog, and Slovene and shows that the non-cancellability of the antecedent is indeed common in languages that do not mandate the use of an additional layer of past morphology in counterfactual conditionals.

**Chinese Data and Analysis**

I gathered my data by presenting two native speakers of Chinese fluent in English (Bryan Wang and Professor Shizhe Huang) with English sentences and asked them to produce translations. Some of the sentences are part of short discourses which illustrate a particular logical property of counterfactual (but not indicative) conditionals. For certain instances I would modify the example and ask the speaker about the felicity of the resulting sentence. Future research should look into the distribution of modal particles in the consequent and should separate the task of producing translated examples from the task of judging their acceptability and use more speakers.

(39) indicative conditional
如果我没有吃这个蛋糕，那么就是你吃的。
If I have-not eat this cake, therefore precisely I eat DE.
If I didn't eat the cake, then you did. (Bryan)

(40) counterfactual conditional
如果我没有吃这个蛋糕，那么你就吃了。
Rúguǒ wǒ méiyǒu chī zhège dàngāo, nàme nǐ jiù huì chī le.
If I have-not eat this cake, therefore you then will eat LE.
If I hadn't eaten the cake, then you would have. (Bryan)

(41) counterfactual conditional using yaobushi
要不是我吃这个蛋糕，你就会吃了。
Yàobùshì wǒ chī zhège dàngāo, nǐ jiù huì chī le.
If-not-that I eat this cake, you then will eat LE.
If I had not eaten the cake, then you would have.

The speaker initially produced (40) when given the stimulus “If I hadn’t eaten the cake, then you would’ve”. I asked him later if yaobushi would work in this sentence and he produced (41). Then I asked him what the differences between the sentences were and he said they mean the same thing, but (40) emphasizes the consequent whereas (41) emphasizes the antecedent. This is an interesting result, but I do not have sufficient data to draw firm conclusions about the nature of emphasis in Chinese conditionals.

(42) canonical yaobushi example (Bryan)
要不是我救了你，你早就死了。
Yàobùshì wǒ jiù le nǐ, nǐ zǎo jiù sǐ le
If-not-that I save LE you, you early then die LE.
If I hadn't saved you, you would have died.

In this case, I asked the speaker to produce a natural example of a sentence containing yaobushi. In this sentence, perhaps because of its emphatic content, yaobushi is more appropriate than the ruguo equivalent. I do not have a complete theory to explain the distribution of ruguo vs. yaobushi other than that yaobushi contributes a counterfactual reading to the sentence.
(43) Thinning the antecedent
(thinning of antecedent cannot change the consequent, as expected)

If Sophie went to the parade and then blocked by a tall person, she will not see Pedro dance.

但是，如果 Sophie 去 了 游行，她 就 不 会 被 一个 高个 拦 住
But, if Sophie go LE parade, she then not will be by one tall-one blocked

(43) borrows a property from Gillies 2007. Namely that thinned antecedents are allowed to precede their non-thinned counterparts of the consequents are the same. In this case, the discourse implies that Sophie did not get stuck behind someone tall. The implication of the Chinese discourse is the same as the English one (Gillies 2007:354).

(44) Sobel Sequence (Shizhe Huang)

If Sophie had participated in the parade but had been stuck behind a tall athlete, she would not have seen the magic show.
The infelicity of the reverse Sobel sequence is predicted by Gillies (2007). If the set of possible worlds under discussion is prematurely expanded, then those worlds cannot be subsequently ignored, hence the second sentence is false. I asked Shizhe Huang to produce the equivalent sequence using \textit{yaobushi}, but she said the result would not be grammatical.

(45) Failure of Hypothetical Contraposition (Bryan)
Rúguò Goethe zài 1832 nián méiyǒu sǐ, tā xiànzài jiù háishi sǐ de.
If Goethe in 1832 year have-not die, he now then still die DE.
(Even) if Goethe had not died in 1832, he would still be dead now.
#如果Goethe现在还活着,他1832年就已经死了。
#Rúguò Goethe xiànzài hái huózhe, tā 1832 nián jiù yǐjīng sǐle.
#If Goethe now still alive, he 1832 year then still died.
#If Goethe is alive now, then he died in 1832

Von Fintel (1999) points to the failure of the contrapositive as a key difference between the counterfactual and the indicative conditional. Indeed, this shows that the antecedent and the consequent affect the discourse very differently. Within Gillies’ framework, this asymmetry is accounted for. The antecedent shifts the domain in order to accommodate at least one world in which it is true, whereas the consequent does not alter the context.

(45) Thinning the antecedent
Rúguò dàishǔ méiyǒu wěiba, tāmen huì shuāidǎo.
If Kangaroo have-not tail, they will fall-down.
If Kangaroos had no tails, they would topple over.

#如果袋鼠没有尾巴，它们会摔倒。
#Rúguò dàishǔ méiyǒu wěiba dàn zhǔ guǎizhāng, tāmen hui shuāidǎo.
Another apparently paradoxical property of counterfactuals is that strengthening the antecedent can cause them to become false. In classical logic this is not true: a more stringent antecedent cannot make a true sentence false. This is, however, entirely expected within the framework since a stronger antecedent can cause previously inaccessible worlds (in this the ridiculous ones with crutches-using kangaroos) to be quantified over. Despite the lack of overt, dedicated morphological marking, the Chinese sentences have the same truth conditions as the English source material.

46) Hypothetical syllogism
如果Hoover是共产, 那他就会是叛徒
Rúguǒ Hoover shì gòngchǎndǎng, nà tā jiù huì shì gè pàntú.
If Hoover is CL communist, that ta then will be CL traitor
If Hoover was a communist then he'd be a traitor.

如果Hoover生在俄罗斯, 那他就会是个共产
Rúguǒ Hoover shēng zài èluóslì, nà tā jiù huì shì gè gòngchǎndǎng
If Hoover born in Russia, that he then will be CL communist
If Hoover had been born in Russia, then he would be a communist.

如果Hoover生在俄罗斯, 那他就会是个叛徒。
#Rúguǒ Hoover shēng zài èluóslì, nà tā jiù huì shì gè pàntú.
#If Hoover born in China, that he then will be CL traitor.
#If Hoover had been born in Russia, he would be a traitor.

The classical syllogism is an important property of indicative conditionals and is expected if the domain being quantified over is not changing. However, in this case the syllogism does not obtain because the first two sentences are quantifying over different domains. The first asks us to consider a Hoover with a different political affiliation and the second a
Hoover born in a different place. The two contexts do not combine in a straightforward way to produce a syllogism, the syllogism would only be valid if the context remained the same.

In order to supplement existing analyses of counterfactual conditionals in Chinese, I consulted a native speaker of English and Chinese and asked him to translate a few sentences from English into Chinese where a counterfactual conditional was used in English and a few indicative conditionals. However, the speaker did not produce any sentences involving yaobushi unless specifically asked for a sentence containing it. He instead preferred using ruguo to translate both the indicative and counterfactual conditionals into Chinese. When asked to translate a Hegel sequence, the speaker said the prompt was confusing and needed more context, so I do not have translations of Hegel sequences at the moment.

Formal Semantics of Counterfactuals

There is a large body of research beginning with Stalnaker (1975) and Lewis (1973) that explores a formal semantics for conditionals that critically revolve around the notion of accommodation. The domain (set of possible worlds) under consideration changes as a result of interpreting counterfactual antecedents. Most of the recent work focuses on interpreting sequences of conditionals in a dynamic context, with much of the debate focusing on the precise division of labor between the semantics and the pragmatics. Theorists such as Gillies (2007) and Von Fintel (1999) propose a model that centers around a discourse object and a topic domain which can change as a result of antecedents. Moss (2007) offers an alternative explanation in which the context consists of a set of “possibilities”, each of which are propositions, that must be explicitly rejected or handled in order for an utterance to be accepted.
In Gillies’ framework, *might* and *would* are duals of each other. Through appropriate use of negation, *might* and *would* can be defined in terms of each other, like existential and universal quantification, or conjunction and disjunction. They are two place predicates related to the concepts of logical possibility and necessity, respectively. *might* is analyzed as existential quantification over the domain of discourse, and *would* is defined as universal quantification. The domain shifts to accommodate the antecedent of *might* and *would*. This shift is a discursive property of the conditional as a whole and independent of its truth conditions.

One interesting consequence of Gillies’ framework is how nicely it fits in with Iatridou’s theory of the ExclF feature. Accommodating the antecedent is a discursive property of counterfactual conditionals that is independent of excluding the present world. Excluding the present world is also a discursive phenomenon and its status varies between an implicature and a presupposition, depending on whether the language uses repurposed TAM morphology to mark counterfactuals or not.

The separation between these two features is critical. Accommodating the antecedent is how we account for the meaning of counterfactual conditionals and the infelicity of certain orderings. The input domain is provided by the discourse, so counterfactual conditionals really do not make sense in isolation. The presupposition vs. entailment distinction does not affect the accommodation process, but it does affect the felicity of following statements. Since a presupposition is a more stringent requirement than mere entailment, it also explains why the dedicated complimentizer *yaobushi* in Chinese is heavily marked.

The two operators Gillies (2007) introduces for describing counterfactual conditionals requires two two-place modal operators, “would” and “might”. We shall define them rigorously below.
Would operator

\[ \text{would}(p, q) \]

interpretation

in the set of possible worlds (the domain) provided by the context, pick the smallest (i.e. most accessible) sphere of possible worlds containing the input domain that intersects the set of \( p \)-worlds. This is known as “accommodating Evaluate the material conditional “\( p \rightarrow q \)” (equivalently “\((\neg p) \lor q\)”, “\( p \) implies \( q \)” or “if \( p \), then \( q \)” at every possible world in the expanded domain.

\( \text{would}(p, q) \) is true if and only if (ii) holds at every world within the expanded domain.

English approximation:
If had been \( p \), would have been \( q \)

The “might” operator is the dual of the “would” operator.

Might operator

\[ \text{might}(p, q) \]

interpretation

in the set of possible worlds (the domain) provided by the context, pick the smallest (i.e. most accessible) sphere of possible worlds containing the input domain that intersects the set of \( p \)-worlds. This is known as “accommodating \( p \)” Evaluate the material conditional “\( p \rightarrow q \)” (equivalently “\((\neg p) \lor q\)”, “\( p \) implies \( q \)” or “if \( p \), then \( q \)” at every possible world in the expanded domain.

\( \text{might}(p, q) \) is true if and only if (ii) holds \textbf{at least one} world within the expanded domain.

English approximation:
If had been \( p \), might have been \( q \)

If we want to combine Gillies’ approach and Iatridou’s approach, we are faced with a problem. In a counterfactual conditional, does “would” contribute universal quantification to the meaning of a conditional? Is “would” merely the past tense of “woll”, the auxiliary verb of which “will” and “would” are both forms? One way to resolve the dilemma is to insist that “woll” always insists that we are quantifying over possible worlds. In purely indicative contexts, “will” refers to future events that are guaranteed to happen and “may” or “might” refer to possibilities.

(49) I will go to school tomorrow.

(50) I might eat cake for breakfast Friday.
Examples (49) and (50) can reasonably be construed to be quantifying over possible future states. The future is fundamentally uncertain and, since both (49) and (50) refer to events taking place in the future, these modal verbs clearly have additional (quantificational) meaning besides locating an event with respect to the utterance time.

If we follow Iatridou’s lead and insist that time is a rigid designation, then events in non-actual worlds have temporal coordinates within our world. The behavior of aspect within counterfactuals is highly variable, depends on the language being studied, and is less interesting in English because it lacks a perfective/imperfective distinction.

The other problem to resolve is how the semantics of indicative conditionals fits in with this picture. A complete theory of counterfactual conditionals should explain how indicative conditionals work. As Heylen and Horsten (2006) argue in “Strict Conditionals: A Negative Result”, the one place predicates “possibly” and “necessarily” do not suffice to describe indicative conditionals. The definitions of “possibly” and “necessarily” in this context are defined below:

(51) Necessarily operator
    necessarily(p)
    in all possible worlds, p

(52) Possibly operator
    possibly(p)
    in at least one possible world, p

I will not go into every example Heylen and Horsten (2006) give. A single example of the nonequivalence of material implication and the indicative conditional should suffice for demonstrating the flavor of the larger proof that one-place predicates are too weak to account the meaning of indicative conditionals. This proof provides the justification for the use of two-place predicates, since one cannot in general determine the truth value of a conditional by independently evaluating the antecedent and consequent.
(53) If there were a largest prime, then pigs would have wings.

The antecedent and the consequent are not related in a causal or relevant manner and yet in classical logic the statement is true because the antecedent is false. Implication is classical logic can be represented with a truth table, it depends only on the truth values of the antecedent and the consequent, not their actual content. Heylen and Horsten give many such examples of indicative conditionals in order to show that a one place modal predicate and the logical connectives and, or, and not are not sufficient to produce a definition that corresponds with their intuitive judgments.

Heylen and Horsten’s examples, along with Sobel and Hegel sequences discussed later, conclusively demonstrate that a one-place modal operator (i.e. one that doesn’t evaluate the antecedent and consequent separately) cannot capture our intuitive judgments as to the truth or falsity of even indicative conditionals. The accommodation process used by counterfactual conditionals elegantly sidesteps this result by imposing an accessibility relation on the various domains, making the domain we quantify over a function of the context and the antecedent of the conditional.

We are thus left with two options, either indicative conditionals are capable of expanding the domain of discourse or accessing “possible worlds” in a way that depends on their content and/or context, or we need to impose some kind of “relevance” relationship between the antecedent and the consequent (Heylen and Horsten 2006:546).

Heylen and Horsten in fact cite Lewis’ (1973) idea of a variably strict conditional, which Lewis (1973) first exploited in his semantics of counterfactual conditionals, and go on to say that Gillies’ theory applies variably strict conditionals to counterfactual conditionals as well. Lewis’ (1973) theory states that counterfactual conditionals can be interpreted semantically by
expanding the domain to accommodate the antecedent and then universally quantifying a classical conditional over the expanded domain. Gillies’ theory expands this by including existential quantification (“might counterfactuals”) as well.

It would appear then that we have a number of options for interpreting indicative conditionals within our account of the semantics of counterfactual conditionals. Indeed, we may want to insist that indicative conditionals and counterfactual conditionals are not meaningfully different aside from the presence of ExclF(w) in counterfactuals. But we do not want to account for a semantic difference with a syntactic test, lest we privilege the status of English and other exclusion-marking languages.

Syntax of English Counterfactuals and the Exclusionary Feature

I begin with a discussion of English counterfactuals and a brief description of their syntax. English counterfactuals contain anomalous past tense morphemes that must be accounted for. This serves two purposes. First, it gives us a convenient means of identifying which conditionals are actually counterfactual in English and identifies a straightforward and consistent strategy a language might use to mark counterfactuality. Second, it shows how tense marking and counterfactual marking share deep discursive properties, such as the content that they implicate.

Iatridou’s seminal work *The Grammatical Ingredients of Counterfactuality* (2000) proposes a single feature called the Exclusionary Feature which ranges over times or worlds (henceforth ExclF(t) and ExclF(w)) to explain the so-called “fake” past tense morphology that
appears in the antecedent of counterfactual conditionals in English, Greek, and other Indo-European languages.

In English, the exclusionary feature is contributed by past tense morpheme itself, although in other languages it can have aspectual realizations as well. Modern Greek requires the use of the imperfective in counterfactual contexts, for instance (Iatridou 2000:240-242). It either locates the utterance in a non-present time (the past) or a non-actual world (a counterfactual). The unmarked use of the exclusionary feature is the past tense. Marking as an event as taking place in the past can be conceptualized as removing the present time from the set of times that the sentence can refer to.

Counterfactual uses of past tense morphology are analogous to the past tense in that they locate a proposition somewhere more remote than the present, actual world. Here, the past tense on an antecedent and consequent signal that the event takes place in a world other than the current one. Iatridou calls this “fake past tense”. The exclusionary feature here implicates that the situation only applies in non-actual worlds.

Both of these can be analyzed as an implicature stating that a proposition does not hold in either the utterance time, or the topic world, respectively. Nevins (2002) extends this analysis and broadly categorizes languages into two groups, those using a dedicated counterfactual complementizer and those using fake past tense to mark counterfactuality. In those cases we observe a correlation: in languages that use the fake past tense to mark counterfactuality, the falsity of the antecedent is implicated; in languages with a dedicated complementizer it is presupposed.

Preliminary Comparisons
Research on Chinese syntax focuses on Chinese and how anaphora resolution works within Chinese conditionals. The work by Chierchia (2000) distinguishes between different types of Chinese conditionals and their varying quantificational force. English has one main method of encoding conditionals, whereas Chinese has at least four (Ruguo, Dou, bare, and Yaobushi). According to Nevins 2002, *yaobushi* is a conditional marker, but Chierchia 2000 only analyzes the first three.

In comparing English and Chinese, we first note a few important differences. Chinese has a special complementizer *yaobushi* that is used exclusively in counterfactual contexts, but not every counterfactual context requires or even licenses *yaobushi*, according to Shizhe Huang. Chinese also does not use fake past tense or fake aspect in conditionals at all. In conditionals, aspectual particles have their normal meanings as opposed to modal ones. According to Nevins, this means that counterfactuality is marked through a dedicated complementizer, although other strategies could also be employed. In either case, the occurrence of counterfactuality within Chinese relies on a fundamentally different mechanism than the ExclF(w) feature since neither tense nor aspect are used consistently to mark counterfactuality.

We would expect, nevertheless, that counterfactuals in Chinese would satisfy some of the same discursive properties as English counterfactuals if Chinese were capable of expressing them at all (i.e. they behave the same way with respect to contraposition, syllogisms, Sobel sequences, and Hegel sequences). In other words, the counterfactual diagnostics should be highly correlated with one another. It would be unlikely for a random assortment of the diagnostics to be satisfied. The properties of English counterfactual conditionals that distinguish them from indicative conditionals rely on establishing a context with a small number of conditionals, and
then possibly rejecting a probe sentence as infelicitous. Gillies’ formal account of the meaning of counterfactuals involves possible worlds and an accessibility relation. It is meant to be a general statement about cognition and meaning rather than a construction specific to English. I intend to use Chinese versions of English probes to test these features.

The speaker did produce different Chinese sentences corresponding to an indicative-counterfactual minimal pair in English. The antecedent is the same in both cases, but the consequent contained different TAM (tense aspect mood) particles. There is no one particle that universally appears in the consequent of counterfactual conditionals, and the interaction between the modal particle in the consequent and counterfactuality appears complex. This result is not predicted by Iatridou’s theory or Nevins 2002 expansion of it since marking should appear either exclusively in the antecedent or in both the antecedent and consequent. It is possible that none of the TAM particles are correlated with counterfactuality.

The speaker’s translation of a Sobel sequence showed the same property as the English examples, namely that inverting the order of the two conditionals resulted in an infelicitous sequence. This suggests that the accommodation interpretation of conditionals has merit even if the language does not use exclusionary morphology to mark the difference between indicative and counterfactual conditionals. It might be possible to achieve the ordering result from other sources though.

For the Sobel sequence with Sophie and Pedro from before, the speaker used yinggai in the consequent, a modal verb which normally means should. I’m a bit suspect of the translation since Chinese separates deontic and epistemic modal verbs consistently in other contexts. Pragmatic translations of counterfactuals are difficult and it is entirely possible that a precisely
equivalent Chinese construction to English counterfactuals simply does not exist. Hence I’m postponing including the data until I can check it more thoroughly.

It is also entirely possible that in Chinese the counterfactuality of a conditional utterance is supplied by context alone and that the appearance of additional syntactic elements in the translations is due to the appearance of counterfactual minimal pairs in the translation task. Examples from Chinese sources that are not translations may be more helpful in determining what factors, if any serve to reliably distinguish counterfactual conditionals from indicative conditionals in Chinese.

There certainly is not a complete gap since *yaobushi* can optionally be used to express counterfactual statements in a manner similar to English. Differences in frequency may have to do with the fact that most of the time counterfactuality is pragmatically inferable, or there are other means of communicating the same content without having to resort to hypothetical possible worlds.

Counterfactuals indeed pose a thorny problem for analysis in languages that do not employ exclusion morphology and where the counterfactual conditional is so heavily marked since the construction is rather frequent in English. This is not to imply that the English construction is perfectly well-behaved either. There are wrinkles in accounting for the future less vivid, which receives a probabilistic interpretation, and wishes, which do not display the cancellability feature.

On the whole though, the theory predicts much of the behavior of Chinese conditionals. The non-cancellability and limited use of *yaobushi* is predicted, as well as the behavior of *ruguo* in its counterfactual usage. The probe sentences show that counterfactual conditionals expressed in Chinese have the familiar semantic and discursive properties that they do in English. If
Chinese conflated indicative and counterfactual conditionals, we would observe very different behavior.

However, Chinese and English counterfactuals have key differences that are explained by Iatridou’s theory. The lack of a dedicated past tense means that exclusionary morphology is not an option in Mandarin Chinese and it has to use a dedicated complimentizer. This complimentizer contributes counterfactual meaning, but endows the antecedent with the status of a presupposition rather than an implicature. We can show that Chinese counterfactuals are not a wholly different phenomenon than English counterfactuals, but rather a related phenomenon with predictable differences.
Works Cited