A Preference Semantics for Imperatives

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Abstract There is a rich canon of work on the meaning of imperative sentences, e.g. Dance!, in philosophy and much recent research in linguistics has made its own exciting advances. However, I argue here that three kinds of observations about imperatives are problematic for approaches from both traditions. I contend that these shortcomings stem from an entirely standard assumption of these semantic theories: a symbol’s meaning is the content it ‘refers to’ or ‘denotes’, e.g. a particular entity, a property, a proposition. In response, I offer a new analysis of imperatives that takes a different form, namely a specific formulation and interpretation of dynamic semantics. Here, the meaning of a symbol is the characteristic role it plays in changing users’ mental states. I propose that imperatives change what’s mutually preferred in the conversation. Preferences have a well-established role in decision theory and artificial intelligence where they are key to understanding how rational agents decide what to do. Analyzing the semantics of imperatives in terms of preferences therefore makes it possible to understand their role in guiding action using well-developed tools from related disciplines. This leads to a precise integration of the semantics and pragmatics of imperatives that makes clear predictions and improves on existing accounts.

Keywords: Imperatives, Dynamic Semantics, Modality, Decision Theory

1 Introduction

This paper presents three observations about imperatives and argues that they are problematic for the two major existing analyses: the property analysis (Hausser 1980, Portner 2004, 2007, 2012) and the modal analysis (Kaufmann 2012, Aloni 2007). These observations concern: (§2.1) the compositional interaction of declaratives, imperatives and connectives; (§2.2) the interaction of imperatives with contextual information; and (§2.3) inferential patterns involving imperatives and connectives. The first and third observations raise a difficult challenge for any semantics which simply treats imperatives as denoting a non-propositional content, e.g. a property (§4.1). There is no way of supplementing such a theory with classical meanings for connectives and a definition

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1 There are, of course, many less linguistically detailed analyses offered by philosophers and logicians. None of them adequately account for these observations either. They will be discussed in due course.
of semantic consequence that can explain the data discussed in §§2.1 and 2.3. Modal analyses are criticized on the basis of data from §2.2, which highlight more general theoretical reasons to prefer the analysis developed here (§4.2).

Below, I develop a semantics for imperatives which does not treat them as denoting (referring to) a content. Instead, their meaning is identified with the characteristic role they play in changing language users’ mental states. I show that using the tools of dynamic semantics\(^2\) one can assign meanings of this kind to all sentence-types and connectives in a way that captures the data from §2.1. The three sentence-types (declarative, interrogative, imperative) are semantically distinguished by the different ways they modify our mental states. Declaratives provide information and interrogatives introduce questions (alternative propositions).\(^3\) My proposal is that \textbf{imperatives promote alternatives}.\(^4\) In particular, \textit{Dance Frank!} ranks Frank’s dancing over Frank’s not-dancing. I understand this ordering of alternatives in terms of a (binary) preference relation over a set of live alternative propositions: \(p_1\) is preferable to \(p_2, \ldots, p_n\) is preferable to \(p_m, \) i.e. \(\{\langle p_1, p_2\rangle, \ldots, \langle p_n, p_m\rangle\}\). The characteristic effects associated with each sentence type are not understood as effects on the agents’ private information, questions or preferences. Building on Stalnaker 1973, 2002, they are effects on what is mutually taken for granted for the purposes of the agents’ linguistic activities. So the basic idea of a preference semantics for imperatives amounts to the idea that \textit{Dance Frank!} makes Frank’s dancing mutually preferable to Frank’s not-dancing (for the purposes of the conversation). This takes the conversationalists from a preference state like \(\langle a, a'\rangle r\) to one with a new preference: \(\langle a, a'\rangle r, \langle a', a\rangle r\rangle \) . Recall that this alternative \(d\) is a live proposition, so it is not the set of \textit{all} worlds where Frank will dance. It does not include worlds where Frank dances but things incompatible with what the conversationalists are presupposing go on, e.g. unicorn births or telekinesis.\(^5\)

The standard effects of declaratives and interrogatives can also be translated to modifications of a preference relation. I set aside interrogatives, except a brief word in §3, because they do not occur in the data discussed here. Declaratives are used to provide information, and the agents’ information is implicit in the preference relation \(r\) used to model their preferences. Identifying information/propositions/alternatives with sets of worlds, the agents’ information \(i_r\) is the set of worlds compatible with at least one live alternative: \(i_r = \cup \{a \mid \langle a, a'\rangle r \) or \( \langle a', a\rangle r\}. Providing the information that Frank will dance thus amounts to restricting each alternative to worlds where Frank


\(^3\) Stalnaker 1978 analyzed the pragmatic function of declaratives as updating information. Hamblin 1958 analyzed interrogatives in terms of introducing alternative propositions, which is compatible with the refinement that the alternatives form partitions (Groenendijk & Stokhof 1982).

\(^4\) See Murray 2010b: Ch.8 for a similar semantics of sentential mood.

\(^5\) This analysis can be refined by specifying the alternatives more exactly. One might, for example, maintain that \textit{Dance Frank!} concerns an alternative consisting of worlds where Frank is the agent of a non-past dancing event. A similar view is that imperatives denote actions, either in a branching-time (Belnap, Jr., Perloff & Xu 2001) or dynamic logic (Segerberg 1989, 1990, Lascarides & Asher 2003, Barker 2012). Nuances about the temporal, aspectual and thematic roles involved in imperatives, and how they differ from declaratives, deserve careful consideration, and likely vary cross-linguistically. But any view about this can be combined with the basic semantics developed here. I avoid offering explanations here that depend on these details, but will highlight cases where this simplification is relevant.
will dance: \(\{\langle p_1 \cap d, p_2 \cap d \rangle, \ldots, \langle p_n \cap d, p_m \cap d \rangle\}\). So, why do I insist that the meaning of imperatives and declaratives is a dynamic effect, rather than the contents used to achieve those effects, \(\langle p, \overline{p} \rangle\) and \(p\) respectively? Couldn’t that static semantics, paired with a pragmatic update procedure for each clause-type provide equivalent results? Surprisingly not. The general argument for this follows in the next paragraph, but it also takes a more concrete form in discussion of the property theory below. Even though this is among the most important points in the paper and deserves to be front and center, it’s a little early for a technical argument and it can be returned to later.

§2.1 presents conjunctions and disjunctions formed from two declaratives, two imperatives and mixtures of the two. Further, in each case the connectives seem to have their ordinary meaning. But no variation of set theoretic operations on these contents delivers a single meaning for these connectives that produces the right results in all cases. If declaratives denote propositions and imperatives denote something non-propositional, then how should conjunction be analyzed in \(A \land !B\)? Normally, the proposition denoted by \(A\) — call it \(a\) — would be modeled as the set of scenarios in which it is true, and conjunction would be modeled as set intersection. But if \(!B\)'s content — call it \(b^*\) — is not a proposition, it cannot be modeled as the set of scenarios in which it is true and so even if it is modeled as a set, intersection with a proposition would yield the necessarily false proposition: the empty set. One way forward it to take conjunctions \(A \land !B\) to denote a ‘content set’ \(\{a, b^*\}\) and formulate an appropriate pragmatic rule which says how to take in the information and directives contained in the content set. It is indeed possible to do this in a way that delivers the right result here and in all other simple cases of conjunction.\(^6\) Yet it remains unclear what to do for a general account of disjunction that covers \(A \lor B, !A \lor !B\) and \(A \lor !B\). To avoid conflating disjunction and conjunction, one might try to find a fourth type of abstract object to serve as the content of disjunctions — also built from a combination of propositions and non-propositional contents — and pair this with a distinct update rule. The result that conjunctions and disjunctions have different ‘pragmatic update rules’ is bad enough, but it gets worse. What content should we assign to \((!A \land !B) \lor (!C \land !D)\)? It cannot be this fourth type of abstract object just used for disjunctions, since this example is semantically composed of two ‘content sets’ rather than propositions or non-propositional contents. So a fifth abstract object is needed, one that is somehow produced by the same process that generated the fourth type of abstract object (less the account of disjunction be, well, disjunctive), and a routine of recursively applying the pragmatic update rules. Due to the recursive structure of language, a static semantics — already looking pale and winded — faces an impossible climb up this hierarchy. Add to this the fact that there are more connectives than \(\text{and}\) and \(\text{or}\) that combine imperatives with declaratives (§2.1), and it becomes clear that a static non-propositional semantics for imperatives is not promising. The need to appeal to recursively applied pragmatic rules that differ upon the connective suggests, I think, where the static approach went wrong: in identifying the characteristic effect of sentences with any process other than their compositional semantic meaning, as well as having connectives semantically operate on ‘contents’. It

\(^6\) Pragmatic update rule: (i) intersect each proposition in the content set and then intersect the result with each alternative; (ii) add each preference to the preference relation (cf. Portner 2012: §4.1).
would be nice to preserve the idea that there is an important semantic difference between declaratives and imperatives. The dynamic semantics offered below negotiates these difficult demands. All sentences are assigned update functions as their meaning, but the update functions for imperatives and declaratives do importantly different things: declaratives provide information while imperatives promote alternatives. In a dynamic semantics, connectives combine two update functions (rather than contents) to form a third. This allows connectives to combine the two types of sentences while granting their important semantic differences. While this approach adheres to the theoretically useful practice of denotational semantics — assigning set theoretic objects as meanings — it differs in its conception of this assignment. Rather than pairing symbols with things they, in some sense, refer to, this approach pairs them with a thing that captures the characteristic role they play in communication and inquiry.

Identifying the meaning of an imperative with a preference update procedure naturally raises the worry that I have misallocated a process requiring the full force of human rationality to our semantic competence with a single morpheme. Identifying the meaning of an imperative with a preference update procedure naturally raises the worry that I have misallocated a process requiring the full force of human rationality to our semantic competence with a single morpheme. Calculating the ideally rational preferences that should result from combining a new imperative and a body of preferences is indeed a challenging feat that requires much more than grasping a linguistic convention. But it is not this feat I claim competent speakers routinely carry out once they become fluent with imperatives. The preferences that result from the semantic process of updating with an imperative may not even be rational, they needn’t reflect all of the consequences an ideally rational agent would draw and they certainly do not guarantee that the agent will choose to bring about the alternative that is best according to them. Words are vessels by which we steer from mental state to mental state. But they are just one of the tools we rely on to set and convey our tack. Rationality — our general ability to make sense of the world and each other — serves as our compass, weaving a coherent route from mere waypoints. The approach to imperatives developed below not only preserves this role for rationality (pragmatics) in language use, it explains some of the rational processes involved in a precise and independently motivated way.

If imperatives essentially involve preferences, some of the rational processes that supplement their semantic contribution should resemble those investigated by decision theorists. Decision theorists investigate rational choice policies: rules for selecting good alternatives given some preferences. But they also investigate rational preference structures: what features rational preferences must have. Below I propose an analysis of imperative consequence in terms of rational choice: if you accept the premises then subsequently accepting the conclusion does not change which alternatives are good or okay choices (§3.6). On this view, speakers’ explore imperative consequences by combining their semantic competence with their rational capacity to track which alternatives are good or okay choices. This dynamic decision-theoretic account of consequence is argued to improve on static ones when it comes to the data in §2.3. Rational preference structures come into play when predicting the felicity of imperative

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7 Charlow (2013) presents this concern forcefully.
9 Fixed point analyses of consequence are standard in dynamic semantics (Veltman 1996: §1.2, van Benthem, Muskens & Visser 2011: §2.1.6) and familiar in deontic settings (Kamp 1973: 66).
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utterances: those that lead to irrational preference structures, and cannot be rationalized by other means, are infelicitous. This appeal to decision theoretic rationality sharpens the lasting insight of Grice 1975, that communication is a species of cooperative rational activity, with a more precise account of the relevant rational activity. However, I will make less idealized assumptions about rational preference and choice than many decision theorists. First, I do not assume that the alternatives agents choose between are maximally specific options, i.e. possible worlds. Second, I do not assume that agents’ are considering every live (uneliminated) alternative or that their preferences are complete, i.e. that they have preferences between all of the alternatives they are considering. Third, I require rational preference structures to meet only those conditions necessary for rational choices to yield practical results: a non-empty and consistent set of alternatives.

I will begin with the three central observations of this paper (§2). In §3 these three observations are explained using the dynamic preference semantics described above. §4 argues that previous analysis are less successful at this task. Those who wish to see that previous theories cannot capture the observations from §2 before investing in §3, may read them in reverse order without a loss of continuity.

2 Three Observations

2.1 Imperatives under Connectives

Can sentential mood (imperative, declarative, interrogative) scope under sentential connectives like and or? This has been a controversial question among philosophers and received limited, but increasing, attention by linguists.10 With imperatives, previous work has focused on combinations, like (1)-(3), that receive conditional interpretations.

(1) Fly to Harare and I'll meet you there.
(2) Piss off a Texan and you'll be sorry.
(3) Move to Portland or you'll never relive the 90s.

These enigmas deserve attention, and will receive some in §3.4. But, they are not ideal evidence of imperative mood scoping under connectives. Do these conditional readings really arise from the standard meaning of the connectives and imperative mood? More conclusive evidence is forthcoming. Consider this context. We've just arrived home in Santa Fe after years away. We need some good New Mexican food. I propose a plan:

(4) I'll make the chile and you make the tortillas!

The obligatory subject in the second conjunct may arouse suspicion, but it is worth noting that (4), unlike (1), is reversible without a change in meaning.11

(5) Make the tortillas and I'll make the chile!

10 No: it's a conceptual confusion (Frege 1923: 2-3) and empirically unmotivated (Dummett 1973: Ch.10). Yes: for all moods and connectives (Searle 1969: 13), or maybe just some (Asher 2007, Krifka to appear). Related work demonstrates an interaction between mood and quantification (Krifka 2001), embedding verbs (Crnić & Trinh 2009) and evidentials (Bittner 2008b, Murray 2010a, Thomas to appear).

11 With (1), I haven't deviated from my own plan if you didn't fly to Harare and I didn't fly out there to meet you. By contrast, with (4) and (5) I have definitely deviated from my own plan if I didn't make the chile, regardless of whether you produce the tortillas.
Since the first conjunct of (5) has a genuine imperative meaning, this equivalence suggests that the second conjunct of (4) has an imperative meaning. Further, the reversibility demonstrates that the *and* in (5) must be conjunction, not a potentially special interpretation of *and*. Finally, switching to a negative imperative in the second conjunct eliminates the troubling obligatory subject.\textsuperscript{12}

(6) I’m going home and don’t (you) try to stop me!

Yet stronger evidence is available from the many languages that explicitly mark sentences for imperative mood. Consider the Plains Algonquian language Cheyenne which marks sentences for mood using verbal suffixes, much as English marks tense with verbal suffixes. Cheyenne moods include declarative, interrogative and imperative — declarative being the unmarked member of the mood paradigm (Murray to appear b).\textsuperscript{13} A conjunction composed of a declarative and an imperative is felicitous in a context like the following. We often perform a song and dance together. Sometimes, I sing and you dance. Other times you sing and I dance. We are trying to plan for a performance later, and I decide that I want to sing. I can communicate my plan by saying:

(7) Ná-to’se-néméne naa ho’sóe-o’o! (Murray to appear b)
\hspace{1cm}1-going.to-sing and dance-DEL.IMP.2SG
\hspace{1cm}‘I am going to sing and (you) dance (then)!’

Indeed, once one looks to languages that explicitly mark mood, a simple conjunction of imperatives also calls for an analysis where *and* scopes under mood. While one might try to argue that English (8) involves one hidden imperative operator that scopes over the conjunction, this is not an option for Cheyenne (9) which clearly contains two imperative morphemes (in bold) under the conjunction *nàa*.

(8) Everybody dance and somebody sing!
(9) Némene-o’o naa ho’sóe-o’o! (Murray to appear b)
\hspace{1cm}sing-DEL.IMP.2SG and dance-DEL.IMP.2SG
\hspace{1cm}‘Sing (later) and dance (later)!’

The flexibility to combine imperatives with declaratives is not limited to conjunction. Similar examples exist with *because, so* and *unless*.

(10) Donate blood because vampires will starve otherwise.
(11) a. Donate some blood so a vampire can eat peacefully tonight.
    b. I’ll make the chile so make the tortillas!
(12) Leave a donation unless you wish to incur God’s wrath.

Disjunction is slightly more nuanced, but there too imperatives embed.\textsuperscript{14} Suppose we’re at a used book sale to stock our joint library. We’ve each found three books, but we only

\textsuperscript{12} I thank Magda Kaufmann for suggesting I find an example of this form.
\textsuperscript{13} Cheyenne contains two imperative forms: immediate and delayed. Only the delayed can occur in (7). The immediate cannot generally be conjoined without a prefix *no’,* meaning *also,* on the second verb (Murray to appear b).
\textsuperscript{14} Data on disjunction in Cheyenne have not yet been collected.
have enough cash for five books. One of us has to put a book back. I suggest:

(13) a. Me: Put back Waverly or I'll put back Naked Lunch. I don't care which.  
     (Me: I'll put back Naked Lunch or you put back Waverly. I don't care which.)  
     b. You: I'm fine with either too.

Unlike (3) and (14a), this disjunction does not have a negative conditional meaning. This is clear from its reversibility and from the fact that these others cannot be followed with either indicator of a free-choice reading: *I don't care which* and *I'm fine with either too*.

(14) a. Me: You put back Waverly or I'll burn your signed edition of Vineland! (#I don't care which.)  
     b. You: #I'm fine with either too.

Conditional imperatives arguably involve an imperative embedded in the consequent.

(15) If Chris tries to leave, close the door!

But perhaps the imperative mood is taking scope over the entire conditional, meaning *Make it the case that if Chris tries to leave, you close the door!* This will not work for languages like Cheyenne, since it marks the verb in the consequent for imperative mood and the verb of the antecedent for conditional mood.

(16) Mah-vé'-héstâhe-to Méave'ho'éno, ho'sóe-o'0! (Murray to appear b)  
     CNJ-CND-sing-CNJ.2SG Lame Deer, dance-DL.IMP.2SG  
     ‘If you are from Lame Deer, dance (later)’

Even for English, examples like (17) make the wide-scope analysis difficult to sustain.

(17) If Chris tries to leave, I'll distract him and you close the door!

How could a wide-scope analysis prevent the bizarre prediction that the imperative being conditionalized is the whole consequent: *I distract him and you close the door*? Since the wide-scope analysis has largely been motivated by despair at a narrow-scope analysis, I hope even the most staunch defenders of a wide-scope analysis will admit that a narrow-scope analysis would be worth seeing.\(^{15}\)

While imperatives clearly embed under connectives, it is important to grant that there are limitations on when such combinations will yield a coherent and useful result. This means that a semantic theory is needed to explain how these structures are interpretable at all and a pragmatic theory to explain why some of these structures have coherent interpretations and others do not. I will focus on the semantic challenge here: to interpret these constructions without positing ambiguous connectives and without blurring the differences between imperatives and declaratives.

\(^{15}\) See Charlow 2013: §2.3 for other arguments against the wide-scope analysis.
2.2 Imperatives, Felicity and Contextual Information

The next observation concerns the felicity of imperatives in certain contexts.

(18) a. # Unicorns have never existed, and never will. Bring me a unicorn!
    b. # The door is open. Open the door!

These cases indicate that the felicity of imperatives depends on the mutual information that precedes their utterance. From one perspective, this connection to information is puzzling given that imperatives are not evaluable for truth or falsity, and so not in the business of providing information. From another, it is completely natural since imperatives are used to guide action, and you can only plan to do what you think is possible. The challenge is to formulate a theory which unites these two perspectives. Meeting this challenge becomes more important as it becomes clear that what you are required to do depends on the information at hand. Suppose you need to do one more chore to earn your allowance and Dad gives you a choice:

(19) Take out the trash or wash the dishes!

Taking out the trash is easier, so you head for the trashcan. To your surprise, it’s empty. You’re do-good brother took it out last night. It’s clear that you better get ready to wash some dishes. Thus, gaining information can change what’s required by an imperative: initially you were required to do either one of the chores, but after more information comes in you’re required to wash the dishes.

A related phenomenon can be seen with the infelicity of both (20) and (21). Suppose you’re a Marine and your sergeant is giving you instructions to work off your demerits. Neither (20) nor (21) would felicitous sequences for the sergeant to utter.

(20) a. Marine, clean that latrine!
    b. #Don’t clean that latrine!

(21) a. Marine, if you’ve never been on latrine duty, clean that latrine!
    b. #If you’ve never been on latrine duty, don’t clean that latrine!

A sergeant that issues (20a) and (20b) has placed two incompatible requirements on you. Every possible action violates a requirement. The point of a requirement is to delimit the good from the bad, steering us away from the bad and towards the good. Since everything violates these two requirements, they form a defective pair. But what about (21a) and (21b)? They are equally infelicitous, but don’t put you in the same bind. If you’ve already been on latrine duty, you are off the hook and can do something else. How then, can we explain the infelicity of (21), and is it possible to unify this explanation with the natural explanation given for the infelicity of (20)? Recall the lesson of the previous paragraph: simply gaining information can create requirements. Consider the requirements that would come into place if, after (21), the information that you’ve never

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16 Charlow 2013 underscores nicely the importance of examples like (20) and (21), and sets out to render them inconsistent in the same way declaratives are. In §3.5 (20) and (21) are predicted to produce irrational preference states: even a perfectly rational decision-maker may find it impossible to satisfy them. At present I do not know how to distinguish these analyses empirically.
been on latrine duty comes to light. You’d be in the same position that (20) placed you in: having no course of action open that doesn’t violate orders. So a uniform analysis of the infelicity in (20) and (21) seem possible. Since new information can bring new requirements into place, and incompatible requirements are bad, imperatives that could bring about incompatible requirements with the addition of new information are bad.

2.3  Imperatives, Consequence and Connectives

The third observation begins with Ross’s Paradox (Ross 1941), which concerns the interaction of imperatives and disjunction. But it will conclude with a generalization of Ross’s Paradox, which also concerns the interaction of imperatives and various connectives that widen the range of actions that, given an imperative, are permissible. Focusing first on disjunction in declaratives, it seems plausible that if what (22a) says is true, then what (22b) says is true (even if actually saying it sounds odd).

(22)  a. You posted the letter.
     b. You posted the letter or you burnt the letter.

But if what (23a) commands is required, is what (23b) commands required?

(23)  a. Post the letter!
     b. Post the letter or burn the letter!

No (Ross 1941: 38)! (23b) provides permission to burn the letter, which is incompatible with being required to post the letter: if you are required to post the letter, you can’t burn it. This highlights a striking difference between being true and being required. If \( \phi \) is true, then any ‘semantically weaker’ sentence \( \psi \) is also true. By contrast, if \( \phi \) is required, then it does not follow that any semantically weaker sentence \( \psi \) is required, precisely because a weaker requirement means more permission and that permission can be incompatible with the stronger requirement. How can this be captured in denotational semantics where ‘semantic strength’ is understood as content inclusion, i.e. \( \phi \equiv \psi \) just in case \( [\phi] \subseteq [\psi] \)? One thing is clear: this standard account of consequence cannot be combined with the standard Boolean analysis of disjunction, \( [\phi \lor \psi] = [\phi] \cup [\psi] \), which predicts disjunction to be a consequence of its disjuncts—regardless of what type of semantic object the disjuncts denote. Contemporary logic has no shortage of non-Boolean analyses of disjunction and non-classical definitions of consequence to go with them. But there is an important constraint that any such analysis must meet.

Solving Ross’s Paradox  However consequence and disjunction are defined for imperatives, Ross’s Paradox means they must either:

i. differ from the parallel declarative cases featuring disjunction, or
ii. reject a classical analysis of consequence for declaratives

This is a paradox because it conflicts with other plausible commitments. Option (i) amounts to saying that or means something different in imperatives and declaratives or that content inclusion is the appropriate account of consequence for one type of
sentence, but not another — even if imperatives have a different kind of content. Option (ii) likely requires rejecting the widely accepted inference of disjunction introduction for declaratives, e.g. (22). §4.1 argues that a property theory of imperatives sacrifices a uniform theory of consequence or a uniform theory of disjunction, as do many other attempts to solve Ross’s Paradox. The analysis proposed in §3 opts for option (ii) but illustrates that it is possible to solve Ross’s Paradox without rejecting disjunction introduction for declaratives. On the dynamic analysis proposed in §3, consequence is defined in terms of preserving a semantic resource — information, alternatives, requirements/permissions — through successive updates with sentences, and it is proposed that it is the preservation of requirements/permissions that are key to imperative consequence. The same dynamic analysis of disjunction used for data from §2.1 yields the right result: (23a) requires that you post the letter while (23b) introduces permission to burn the letter, thereby weakening the original requirement to just permission. Since this transition does not preserve requirements/permissions, it is invalid. But what about adopting a non-classical semantics that invalidates all forms of disjunction introduction? Since there is a plausible Gricean explanation for why (22) sounds odd, such an approach would require a new and substantial argument against the validity of declarative disjunction introduction. Even if such an argument were in hand, the theory outlined here would likely fare better than other options. It furnishes two accounts of consequence (informational and alternative) that can plausibly be applied to declaratives. Informational consequence validates declarative disjunction introduction, while alternative consequence invalidates it. This means that the analysis can be developed in two ways: (a) a rejection of all disjunction introduction by embracing alternative consequence for declaratives; (b) a more nuanced account where intuitions about declarative disjunction introduction will vary depending on which form of consequence better fits the purposes of the conversation. Both ways seem at least as good as applying other non-classical logics that invalidate disjunction introduction to imperatives. Linear (Girard 1987, Di Cosmo & Miller 2010) and relevance logics (Anderson & Belnap 1975, Anderson, Belnap & Dunn 1992, Mares 2012) require two disjunction operators to capture all the logical relations that should hold between disjunctions and other formulas (some not pertaining to disjunction introduction); one invalidates disjunction introduction and the other doesn’t. Applying these logics to imperatives would come at the expense of rendering or ambiguous. Dynamic logic (Harel, Kozen & Tiuryn 2000, Harel 1984) provides a disjunction-like operator, program choice $\cup$, that parallels the definition of disjunction used below, and there is a rich literature applying dynamic logic in deontic settings. Dynamic logic sharply distinguishes sentences and programs, and $\cup$ only combines programs, e.g. $\pi_1 \cup \pi_2$. Programs are used to build up complex modal operators, e.g. $[\pi_1 \cup \pi_2]$ A meaning ‘A must hold after a random choice between executing $\pi_1$ or $\pi_2$.’ The syntactic difference reflects a deep semantic one: a program’s semantics specifies how its execution changes the state of a machine, while a sentence’s specifies its truth-conditions. To employ $\cup$ in a language where it can combine declaratives and

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17 Though it is important to stress that the central ideas of linear logic — that reasoning is sensitive to how resources are used — and relevance logic — that good reasoning does not involve wild shifts in topic — are clearly reflected in the proposed dynamic analyses of consequence.

imperatives requires abandoning the distinction between programs and sentences: treat everything as a program and eliminate the truth-conditional expressions. This adaptation of dynamic logic would converge exactly with the analysis developed below. Indeed, the analysis of conjunction also has a parallel in dynamic logic: program sequencing ‘;’, where \([\pi_1; \pi_2]A\) means ‘A must hold after executing \(\pi_1\) and then \(\pi_2\).’

Above, I alluded to the possibility of pragmatically explaining why declarative disjunction introduction sounds odd. Why couldn’t that explanation be used to explain the oddity of imperative disjunction introduction too? Hare 1967 sketches just such an approach, noting that if one thinks of what imperatives command as being satisfied/unsatisfied instead of being required or not, then the inference in (23) seems less egregious. If you have satisfied the command Post the letter! then you’ve satisfied the command Post the letter or burn the letter! So perhaps the inference is valid, but sounds odd in the same way that inferring a declarative disjunction from one of its disjuncts also sounds odd. The Gricean explanation for the latter fact is simple: assertions typically implicate that logically stronger propositions are not known. For example, asserting \(A \lor B\) implicates that \(A\) is not known. So asserting \(A \lor B\) after asserting \(A\) implicates that the speaker does not know \(A\) just after they’ve asserted \(A\). Perhaps there is a parallel for commands: commanding \(!A \lor !B\) implicates that \(!A\) isn’t required, making it odd to say \(!A\) and then \(!A \lor !B\). Unfortunately, this appealing account does not work.

One of the questions at stake is which concept should play the role of truth for imperatives (or ‘what they command’). Truth provides a standard of correctness. Propositions that are correct about a certain world are true in that world. Are correct commands satisfied? It would seem not. What No one commit murder! commands is correct, but this command is sadly not satisfied. However, correct commands are required. Just as truth also plays a crucial role in defining declarative consequence, it would seem then that requirement (or permission) should play that role in defining imperative consequence. There are additional, related arguments for this position in the philosophical literature (e.g. Lemmon 1965), but there is also empirical evidence against the Gricean strategy.

If you issue (24a) to me and I accept it, I am not licensed to infer (24b). So, however consequence is defined, (24b) should not follow from (24a).

(24)  
\begin{enumerate}
    \item a. Post the letter
    \item b. I may burn the letter.
\end{enumerate}

But if one allows Post the letter or burn the letter! to follow from (24a), one ends up with just that result. After all, it seems quite obvious that \(Y\) may make the following inference after accepting \(X\)’s command:

(25)  
\begin{enumerate}
    \item a. \(X: \text{Post the letter or burn the letter!}\)
    \item b. \(Y: \text{So, I may burn the letter.}\)
\end{enumerate}

So if (25a) follows from (24a), then so does (24b). More succinctly, the following two facts require that \(!P \lor !B\) does not follow from \(!P\):

(26)  
\begin{enumerate}
    \item a. \(\neg \neg \text{May B}\)
    \item b. \(\neg \neg \text{May B} \vdash \text{May B}\)
It is therefore quite reasonable to require that \(!A \lor \neg B\) does not follow from \(!A\). While Hare (1967) might reply that (25) involves a mere implicature, this hypothesis is at odds with the fact that the inference is not cancelable:

(27) 
   a. \(X\): Post the letter or burn the letter!
   b. \(X\): # Though you may not burn the letter.

Indeed, similar examples illustrate that it is implausible to treat the non-requirement of \(A\) as an implicature of \(!A \lor \neg B\).

(28) 
   a. \(X\): Post the letter or burn the letter!
   b. \(X\): # Though I require you to post it.

Ross’s Paradox demands a semantic solution, but there is a commitment of this strategy that is rarely appreciated. Ross’s Paradox, at least as presented above, relies on the fact that moving from \(!A\) to \(!A \lor \neg B\), or \(!A \land \neg B\) is incorrect because the range of actions permitted by the premise is smaller than the range of actions permitted by either of the conclusions. Every way of posting a letter is not a way of posting or burning it. While disjunction widens the range of actions considered, conjunction narrows it. That means that the inference from \(!A \land \neg B\) to \(!A\) should be equally bad. After all, the range of actions permitted by the premise, which involve doing both \(A\) and \(B\), is smaller than the range of actions permitted by the conclusion, which involves merely doing \(A\). For example, the act of administering a poison and its antidote might be permitted while simply administering the poison is not. With enough context, examples of this kind provide clear counterexamples to the inference of \(!A\) or \(!B\) from \(!A \land \neg B\).

Consider Bernie, the kind-hearted mobster, and his ruthless minion Monica. Monica is to interrogate a known snitch, Jimmy. Bernie doesn’t care for serious torture, so he’s developed another method. He will have Monica inject Jimmy with both a deadly poison and its antidote. When the two solutions are administered simultaneously they produce only minor cramps and shortness of breath. Monica is to tell Jimmy that he will be administered the antidote if he confesses and informs on other snitches. Bernie knows Monica has a lot of poison, but no antidote. So, before she goes to abduct Jimmy, Bernie hands her a syringe with both solutions in it and instructs her thus:

(29)  Monica, inject the snitch with poison and antidote!

Monica should not infer:

(30)  #So, inject the snitch with poison!

If you remain unconvinced, note that Monica cannot privately infer (31), which would clearly follow from (30).

(31)  I may inject the snitch with poison.

So it would seem that \(!A\) does not generally follow from \(!A \land \neg B\). Rather different counterexamples to this pattern have been discussed by others, but other than a brief

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19 Segerberg 1989: 329-30 presents a more artificial example, while Charlow 2013: §2.2 presents an example that supports only the generalization that the right conjunct does not follow. As noted in Fox 2012: 881, counterexamples of that variety could also be analyzed by appeal to temporal content applicable to parallel declarative conjunctions, unlike (29). If Monica injected the snitch with poison and antidote, the she injected the snitch with poison. Similar counterexamples to Ought\((A \land \neg B) \equiv Ought(A)/Ought(B)\) have been discussed in the deontic logic literature (Kamp 1973, Jackson 1985).
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logical remark by Segerberg (1990: 217) no one has noted that they are a natural, and perhaps necessary, companion to Ross’s counterexamples involving disjunction. Indeed, there is another kind of example involving negation and conjunction that illustrates the same point. Consider Bernie again. He’s nervous after Monica sets off to get Jimmy. Bernie remembered that she once injected a snitch with poison and then administered the antidote after he’d expired. He calls her to clarify:

(32) Let me be clear Monica. Do not inject Jimmy with poison!

Monica should not infer:

(33) #So, don’t inject Jimmy with poison and antidote!

In this case, Monica should clearly resist inferring \( \neg(A \land B) \) from \( \neg A \). In Boolean terms, this parallels Ross’s inference exactly. \( \neg(A \land B) \) should be equivalent to \( \neg A \lor \neg B \). These observations suggest a generalized formulation of Ross’s paradox:

**Solving the Generalized Ross’s Paradox** However consequence and connectives are defined for imperatives, the Generalized Ross’s Paradox means they must either:

i. differ from the parallel declarative cases featuring those connectives, or
ii. reject a classical analysis of consequence for declaratives

This form of the paradox is harder to solve. A special treatment of disjunction will not suffice, and denying the validity of parallel declarative patterns is much less plausible. Ross (1941) rightly took his paradox to vitiate Jörgensen’s (1937) theory, as it does many subsequent approaches.20 The generalized form of the paradox only makes matters worse. These approaches propose new semantic values for imperatives but have one of three problems. Some treat both imperative and declarative disjunction as Boolean and thereby incorrectly. Some give unrelated meanings to imperative and declarative disjunction. Others give a definition of imperative consequence that bears no resemblance to declarative consequence. None of them is able to address the parallel examples involving conjunction. Ross 1941 and Williams 1963 concluded that a dramatic prohibition is in order: *Don’t bother with imperative semantics and logic! It doesn’t exist!* But this pessimism doesn’t follow. Modal and property theories are enough to lift this fog of despair. I turn now to presenting the preference semantics analysis and I will then argue that it improves on those two theories.

3 A Preference Semantics for Imperatives

The analysis I will propose is formulated in a new system of dynamic semantics. In this system the meaning of a sentence is not understood in terms of what it picks out (denotes), such as a proposition or property. That familiar model is replaced with one where a sentence is understood in terms of its characteristic effect on the mental states of language users. However, the two models are closer than it might seem. Mental

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states are not modeled in terms of mental representations or brain states, but in terms of their content. As is common in formal semantics and decision theory, content is modeled using possible worlds. Some mental states, like belief, have informational content. Information distinguishes ways the world could be from ways it isn’t. So a set of possible worlds provides an approximation of informational content (‘propositions’): it includes some worlds and excludes others (Stalnaker 1976, Lewis 1983: 4). Other mental states, like wondering, have inquisitive content (‘questions’). Inquisitive content distinguishes the information which is sought, propositions that are answers, from that which is not. It is modeled as a set of propositions: the answers (Hamblin 1958, Karttunen 1977, Groenendijk & Stokhof 1982). The dynamics of informational and inquisitive mental states already play a central role in explaining language use. I will begin the presentation of my analysis by summarizing these roles, remaining neutral on whether they are to be captured pragmatically or semantically. I then add motivational mental states, preferences, to the mix, along with a model of them in terms of their content: a binary ordering of propositions. My initial proposal in §3.1 is just that the conversational dynamics of imperatives, be it pragmatics or semantics, can be understood in terms of preferences: an essential component of a directive speech act like Run Alice! is making, for the purposes of the conversation, worlds where Alice runs mutually preferable to worlds where she does not. As I will discuss in §5.1, the exact nature of a directive speech act, e.g. command or advice or insult, will depend on how this preference, mutually adopted for the purposes of the conversation, is taken to relate to the private preferences of the speaker and audience, as well other socially salient preferences. But the key idea developed here is that directive speech acts begin with a promotion of some alternative(s) that the speaker may be publicly expected, at least for the purposes of the conversation, to pursue. §3.2 shows that standard ideas from decision theory about how rational agents use preferences to choose actions explains nicely how adding preferences can change which alternatives the addressee is publicly expected to pursue. That section also shows how the familiar ideas of permission and requirement can be understood in decision theoretic terms. I subsequently formulate a semantics which pairs a sentence not with a static content, but a dynamic function from one state of information, questions and preferences to another (§3.3). These dynamic functions parallel the conversational roles identified in §3.1. In §§3.4-3.6 this semantics is shown to explain the three observations from §2.

3.1 The Dynamics of Information, Questions and Preferences

When communicating, language users rely heavily on some information being mutually taken for granted (Lewis 1979, Clark & Marshall 1981, Grice 1989, Stalnaker 1978, 2002). This information is what’s being presupposed for the purposes of the conversation: it is presupposed that \( p \) only if everyone accepts \( p \) for the purposes of the conversation, and all believe that all accept \( p \) for the purposes of the conversation, and all believe that all believe that all accept \( p \) for the purposes of the conversation, etc.\(^{21}\) Successful assertions augment this background by making more information presupposed (Stalnaker 1978). In

\( ^{21} \) For finite representations of this iterated attitude see Fagin, Halpern, Moses & Vardi 1995, Clark 1996.
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terms of content, the **presupposed contextual information** \(i\) comes to be restricted to a smaller set of worlds. Consider an example where there are just two possible messages A (*Alice ran*) and B (*Bob ran*). Just four worlds are needed to cover every possibility; one for each Boolean combination. Figure 1 depicts the process of presupposing no information \(i_0\) and then coming to presuppose the information carried by an assertion of A (lower-case signifies falsity). Language use not only relies on and creates a background of information, but also a background of questions (Bromberger 1966, Roberts 1996, Ginzburg 1995a,b, Hulstijn 1997, Groenendijk 1999). The questions distinguish which information (propositions) the agents are, for the purposes of the conversation, mutually seeking. I call the set of all such propositions the **contextual questions** \(Q\). Figure 2 depicts the process going from no presupposed information or questions \(Q_0\) to presupposing the question raised by an inquiry of whether A. Thinking of language use as a process by which this background evolves invites the idea that \(Q\) at any given time characterizes the state of the conversation at that time. After all, it records not only the questions at stake in the conversation, but also the information since \(i = \bigcup Q\). For many purposes, this model of conversational states suffices. But explaining

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\[ \begin{align*}
i_0 &= \{ w_{AB}, w_{Ab}, w_{aB}, w_{Ab} \} \\
i_1 &= \{ w_{AB}, w_{Ab} \}
\end{align*} \]

**Figure 1** Accepting the information carried by an assertion of A

\[ \begin{align*}
Q_0 &= \{ i_0 \} \\
Q_1 &= \{ \{ w_{AB}, w_{Ab} \}, \{ w_{aB}, w_{ab} \} \}
\end{align*} \]

**Figure 2** Accepting the question raised by an inquiry of whether A

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22 This is the simplest model of background questions but may need to be subjected to certain conditions e.g. downward closure (Ciardelli, Groenendijk & Roelofsen to appear). More structure is assumed by others (Hulstijn 1997, Groenendijk 1999, Roberts 1996). The question of which model is best is unresolved and irrelevant to the data analyzed here, so I opt for the simplest.
how imperatives are used to influence action requires understanding how rational agents decide what to do. Work in decision theory, artificial intelligence and philosophy suggests understanding this process in terms of preferences: agents form preferences between alternatives (Ramsey 1931, Savage 1954, Newell 1992, Hansson & Grüne-Yanoff 2011). What are alternatives? What does it mean to say that I find dancing preferable to not dancing? It at least entails that I will prefer the news that I'm dancing to the news that I'm not dancing. I will go further an identify preferences with a relational propositional attitude: it ranks one alternative proposition over another (Jeffrey 1990: §5.7).

23 Some balk at this idea, insist on preference and choice are about actions, not propositions. Such readers are invited to read Jeffrey 1990:§5.8, recall the discussion of alternatives in the introduction and consider the following. There is no formal model of actions that can’t be simulated with propositional preferences. On one model, actions are just events that have an agent. This can be recast with propositions about such an event existing. On the branching time and dynamic logic model actions are pairs of worlds/times differing in the change brought about by the action. The preferred proposition is the set of all right elements of such a pair and the dispreferred proposition is the set of all left elements (ignoring \(w, w'\) where \(w = w'\)). Doesn’t this ignore Searle’s (1969) direction of fit distinction? That distinction has never been successfully analyzed in terms of content, but only in terms of the function a content serves, e.g. Dretske 1988. A set of worlds does not, in and of itself, represent how the world is. It could just as well indicate how the world should be. (Searle dislikes functional analysis, forcing him to treat direction of fit as an unanalyzable primitive, nonetheless external to content.)

As with information and issues, it is important to distinguish what the agents’ privately prefer from what they are mutually preferring for the purposes of the conversation. It is only the latter which imperatives directly influence. It is also important to distinguish weak preference — a is at least as preferable as a’ — from strict preference — a is preferable to a’ and not equally preferable as a’. Strict preference is more appropriate here. Consider the preferences introduces by \(\neg A\) and \(\neg \neg A\), respectively. If these were weak preferences, there would be no conflict between them. Issuing both would communicate that A and \(\neg A\) are equally preferred, and there is no inconsistency or irrationality in that. But how could someone strictly prefer A to \(\neg A\) and strictly prefer \(\neg A\) to A? From here on, by preference I mean strict preference.

A formal model of conversational states which includes preferences needs to include a relation over live alternatives (a set of pairs of propositions). A info relation \(r\) accomplishes this and allows one to articulate the basic idea that imperatives introduce preferences. As Figure 3 depicts, issuing a directive in favor of A introduces a preference for the A-worlds over the \(\neg A\)-worlds, where complementary colors depict preferences, reserving the warm color for the favored alternative. The question is whether one can do with just an info relation, as one could do with just Q to model information and issues. For the data concerned here, yes — though little would change if the theory were recast in terms of conversational states that were pairs \((Q, r)\). Figure 3 does not say which set-theoretic object corresponds to \(r_0\). If we say a state with no preferences is \(\varnothing\), it would be impossible to model a state with some information and issues, but no preferences. Instead I will identify a state like \(i_1\), which contains the information that A, no preferences and no issues, with \(\{(w_{AB}, w_{\neg AB}), \varnothing\}\). In general, the agents’
Information \( i_r \) is the set of worlds compatible with at least one live alternative: 
\[ i_r = \bigcup \{ a \mid (a, a') \in r \text{ or } (a', a) \in r \}. \]
A state like \( Q_1 \) that contains the question whether \( A \), but no information or preferences, can be identified with 
\[ \{ \{ w_{AB}, w_{Ab} \}, \varnothing \}, \{ w_{aB}, w_{ab} \}, \varnothing \}. \]
In general, \( Q_r = \{ a \neq i_R \mid (a, \varnothing) \in r \}. \) Table 1 summarizes the types of mental states, their contents and their relational construals discussed above. It would seem, then,

<table>
<thead>
<tr>
<th>Mental State Type</th>
<th>Content Type</th>
<th>Base Content</th>
<th>Relational Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informational</td>
<td>Proposition/Alternative</td>
<td>( a = { w_0, \ldots, w_n } )</td>
<td>( { (a, \varnothing) } )</td>
</tr>
<tr>
<td>Inquisitive</td>
<td>Question/Issue</td>
<td>( { a, a' } )</td>
<td>( { (a, \varnothing), (a', \varnothing) } )</td>
</tr>
<tr>
<td>Motivational</td>
<td>Preference</td>
<td>( { a, a' } )</td>
<td>( { (a, a') } )</td>
</tr>
</tbody>
</table>

Table 1 Summary of Mental States, Contents and Their Relational Analogs

that an info relation \( r \) encompasses everything needed here to model the state of a conversation. But one more adjustment is needed.

When I say that uttering an imperative introduces a preference, that leaves open the possibility of an imperative introducing several preferences. It seems like that is simple to model with an info relation: an imperative, perhaps \( !A \land !B \), could add both a preference for \( A \)-worlds over \( \neg A \)-worlds but also a preference for \( B \)-worlds over \( \neg B \)-worlds. But it is also plausible that \( !A \lor !B \) adds multiple preferences—it certainly says something both about the preferability of \( A \) and about the preferability of \( B \). Unless conjunction and disjunction introduce multiple preferences in different ways, a bad consequence looms: the two constructions update the conversational state identically—cf. discussion of Portner 2012 in §4.1. My proposal, detailed in §3.4, is that disjunctions of imperatives put in play a preference for each disjunct, either of which can be acted on, while both of the preferences put in play by a conjunction must be acted on. To capture this, I model a conversational state not as a simple info relation, but a set of them. For a simple case where \( R = \{ r \} \), the idea is that a conjunction of imperatives introduces two new preferences into \( r \), while the disjunction of two imperatives will spawn two info relations: one where the preference of the first disjunct has been added to \( r \) and one where the second disjunct has been added to \( r \).
Definition 1 (Conversational States, Info Relations)

1. A **conversational state** \( R \) is a set of info relations
   
   \[ R = \{r_0, \ldots, r_n\} \]

2. A **info relation** \( r \) is a relation on propositions
   
   - \( W \) is a set of possible worlds
   - \( r : \mathcal{P}(W) \times \mathcal{P}(W) \)

3. The **information** \( i_R \) in a conversational state \( R \) is the union of all propositions related by some \( r \in R \).
   
   \[ i_R = \bigcup\{a \in \text{field } r \mid r \in R\}, \text{ where field } r = \text{dom } r \cup \text{ran } r \]
   
   \[ i_r = \{a \in \text{field } r \mid r \in R\} \]

4. The **questions** \( Q_R \) in a conversational state \( R \) is the set of all propositions, other than \( i_R \), ranked over \( \emptyset \) in some \( r \in R \)
   
   \[ Q_R = \{a \neq i_R \mid \exists r \in R : \langle a, \emptyset \rangle \in r\} \]

A semantics for imperatives, disjunction and conjunction will be detailed below. So far, I have only presented a model of conversational states that stands some chance at capturing the dynamics of speech acts in which that vocabulary figures. But even this presentation has been incomplete: how does analyzing the dynamics of imperatives in terms of preferences explain how they serve their conversational function? Answering this question is not only essential to the general project of this paper. It will make it much easier to interpret the semantics presented for imperatives in in §3.3.

3.2 The Pragmatics of Imperatives: preferences, rationality and choice

The conversational function of an imperative is to promote some alternative(s) that the addressee might be publicly expected, at least for the purposes of the conversation, to pursue. It is by this process that directive speech acts provide permission and make requirements. How does introducing preferences accomplish this? My goal in this section is to show that changing the preferences to which an agent is publicly committed can change which alternatives the addressee can be expected to pursue if they are rational. This is the same kind of pragmatic explanation introduced by Grice 1989: deriving conversational effects from the semantic contribution of a sentence together with assumptions about the conversationalists’ mutual rationality.

Grice 1989 appealed to rational processes that were only informally described and rarely cast in terms familiar to specialists working on rationality. But a semantics of imperatives based on preferences can appeal to a precise sense of rationality investigated in decision theory: how should rational agents choose alternatives given their preferences?

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24 This allows \( Q_R = \{a\} \) when \( a \neq i_R \) and \( R = \{\langle i_R, \emptyset \rangle, \langle a, \emptyset \rangle\} \). Whether not such a state is useful or meaningful is unclear. But it could be easily excluded if so desired.
Decision theorists investigate this question by studying different choice functions. A choice function takes a body of preferences and returns the set of alternatives a rational agent should pursue given those preferences; hereafter the good alternatives. In the present setting, this means applying a choice function to an ‘info relation’ to deliver a set of alternatives. Recall that info relations also encode information and issues using vacuous preferences (preferring \( a \) to \( \emptyset \)). Since a vacuous preference does not promote an alternative, it does not make sense to apply a choice function to an info relation that has only vacuous preferences, nor does it make sense to select alternatives that are only vacuously preferred. Further, to count as promoted an alternative needs to be part of a preference that covers every live possibility. Suppose you prefer hiking and singing to hiking and not singing, but you regard not hiking as a live possibility. It does not follow that you should hike and sing. This will be key in the analysis of conditional imperatives (§3.4.1). These points about preference relations, promoted alternatives and choice functions are codified in the definition below.

Definition 2 (Preference States/Relations, Promoted Alternatives, Choice Functions)

1. A conversational state \( R \) is a preference state just in case it contains at least one preference relation: \( \exists r \in R: r \) is a preference relation.

2. \( r \) is a preference relation just in case it promotes at least one alternative: \( P_r \neq \emptyset \).

3. \( r \) promotes an alternative \( a \) just in case \( a \) is ranked over something other than \( \emptyset \), and is part of a preference that covers every live possibility.\(^25\)
   - \( P_r = \{a \mid \langle a, a_1 \rangle \in r \& a_1 \neq \emptyset \& \exists a_2: \langle a, a_2 \rangle \in r \& a \cup a_2 = i_r \} \)

4. \( Ch \) is a choice function just in case it is a function that maps a preference relation \( r \) to some subset of the alternatives promoted by \( r \): \( Ch(r) \subseteq P_r \).

Non-dominance is the simplest and most intuitive choice strategy that applies to the kinds of preferences under consideration (Hansson & Grüne-Yanoff 2011: §3.2).\(^26\) The basic idea is that you shouldn’t choose alternatives that are dominated, i.e. ones that are worse than something. The promoted alternatives that aren’t dominated are the best. But, since alternatives are propositions, being dominated is not as simple as just being ranked below some alternative. An alternative is also dominated if it is entailed by an alternative that is ranked below another.

Definition 3 (Non-dominated Choice, \( Ch \))
\[
Ch(r) = \{a \in P_r \mid \exists a_1, a_2 \neq \emptyset: \langle a_1, a_2 \rangle \in r \& a_2 \subseteq a \}
\]
   - \( a \) is a good choice in \( r \) just in case \( a \) is promoted and no alternative is preferred to \( a \) or some (non-empty) alternative that entails \( a \).

\(^{25}\) The second condition alone would not prevent \( \langle i_r, \emptyset \rangle \) from ‘promoting’ \( i_r \).

\(^{26}\) Another dominance-based strategy is to choose alternatives which are at least as preferable as any other alternative. This strategy is defined in terms of at least as preferable, so it does not apply to strict preferences. It also only works when preferences are complete: when they rank every pair of alternatives considered. Both features are problematic in the current setting.
For a simple preference relation like $r_1$, $Ch$ simply picks the one promoted alternative (orange). The added nuance about entailment is required for preference relations like $r_2$. In this case, two conflicting imperatives have been issued and the resulting preferences

$Ch(r_1) = \{ w_{AB}, w_{Ab} \}$

$r_1$: accepted $!A$

$Ch(r_2) = \emptyset$

$r_2$: accepted $!(A \land B)$ and $!\neg B$

$Ch(r_3) = \emptyset$

$r_3$: accepted $!B$ and $!\neg B$

**Figure 4** $Ch$ applied to three preference relations

are also in clear conflict: any way of bringing about the alternative promoted by one preference will result in bringing about the alternative rank below the other. A rational decision-maker should be sensitive to this conflict and treat it no differently than the case in $r_3$ where B-worlds are ranked over $\neg B$-worlds. In both cases, acting on any promoted alternative is bad because it brings about a dominated alternative. So no alternative is okay, let alone good. Both cases yield no actionable alternatives. That is the cost of symmetric preferences: if you try to choose rationally on the basis of them, there are no options you can choose! This is an important point. It illustrates that no matter how rational your choice is, it can still fail if your preferences aren’t rational.

What does it mean to say that an attempt to make a rational choice has failed? Set aside the formalism and think about what is being modeled: how agents decide what to do. A decision which culminates in no alternatives is a failure because it doesn’t settle on anything to do. A decision which settles on an inconsistent alternative or jointly inconsistent alternatives is also a failure: you can’t do the impossible, so you can’t bring about inconsistent alternatives. Planning to do so is no plan at all. This tells us something important about any rational preference relation $r$: a rational choice must select at least one good alternative on the basis of $r$ and a rational choice must select a consistent set of alternatives on the basis of $r$.

**Definition 4 (Rational Preference Relations, States)**

1. A preference relation $r$ is **rational** just in case $Ch(r) \neq \emptyset$ and $\bigcap Ch(r) \neq \emptyset$.

2. A preference state $R$ is **rational** just in case for all $r \in R$: $Ch(r)$.

27 A different intuition: each alternative is bad, but that doesn’t mean they aren’t also good. They’re good in the sense of being the best of the bad, as in genuine moral dilemmas. Following this intuition calls for a choice function that selects both the $B$ and $\neg B$ alternatives for $r_3$. There is such a choice function, and it agrees everywhere else with Non-dominance. **Optimization**: good alternatives are promoted ones and have a score at least as high as any other. $a$’s score is the number of promoted alternatives $a$ entails minus the number of promoted alternatives with which it is inconsistent (cf. van Fraasen 1973: 18). I’m inclined to Optimization, but Non-dominance suffices for the data here.
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Fortunately, it is known exactly when preference relations are rational in this sense.

**Fact 1 (Rational Preferences Aren’t Cyclic and Don’t Promote Absurdity)**

\( \text{Ch}(r) \neq \emptyset \) and \( \cap \text{Ch}(r) \neq \emptyset \) if and only if \( r \) is acyclic and doesn’t promote absurdity.\(^{28}\)

1. \( r \) is **cyclic** if and only if there is a series \( a_1, a_2, \ldots, a_n \) such that \( (a_1', a_2'), \ldots, (a_n', a_1') \in r \), where \( a_1' \subseteq a_1, a_2' \subseteq a_2, \ldots, a_n' \subseteq a_n, a_1'' \subseteq a_1'. \)

2. \( r \) promotes **absurdity** if and only if \( \exists a : (\emptyset, a) \in r \).

Isolating these features allows us to identify the hallmarks of irrational preferences. This will be important in §3.5 where I aim to explain pragmatically the infelicity of certain imperatives by pointing out that they are cyclic or promote absurdity. This highlights an important point: there will be no restriction on cyclic or absurdity promoting alternatives in the **semantics**. Those are preferences that we can be led to by the use of language. But our pragmatic competence encompasses an ability to rationally assess our preferences, and thereby ring the alarm in these problematic situations.

Recall that one goal of this section was to show that adding to the preferences to which an agent is publicly committed can change which alternatives they can be expected, for the purposes of the conversation, to pursue if they are rational. All the pieces necessary to show this are in place. Suppose an agent X is choosing rationally, i.e. choosing in accord with \( \text{Ch} \), and is publicly committed to preferences \( r_0 \) that are rational in the sense just defined. Then the conversationalists can expect, for the purposes of the conversation, that X will pursue the alternatives in \( \text{Ch}(r_0) \). Now suppose X comes to be publicly committed to some additional preference \( a, a' \) that produces another rational preference relation \( r_1 \). Then the conversationalists can expect, for the purposes of the conversation, that X will pursue the alternatives in \( \text{Ch}(r_1) \). In many cases \( a \) will be non-dominated in \( r_1 \), and so it will be the case that \( \text{Ch}(r_0) \neq \text{Ch}(r_1) \). Thus, adding to the preferences that an agent is publicly committed to can change which alternatives they can be expected, for the purposes of the conversation, to pursue if they are rational. This fact shows that understanding the conversational dynamics of imperatives in terms of preference change explains how they serve their conversational function: to promote some alternative(s) that the speaker might be publicly expected, at least for the purposes of the conversation, to pursue. However, I also noted earlier that part of this function is to permit and require alternatives, about which I’ve said nothing.

Permission and requirement can be understood in terms of the alternatives chosen by \( \text{Ch} \). But to do so, I must draw attention to something I have been ignoring in this section: conversational states are sets of info relations, not mere info relations. I spoke immediately above as though the good alternatives in a given context are determined by just one preference relation/info relation. How can \( \text{Ch} \) be used to determine which alternatives are good relative to a set of preference relations (a **preference state**)? The solution is obvious enough: good alternatives are those chosen for every preference relation in the state. What about those alternatives chosen for just some preference

\(^{28}\) This is a small but obvious generalization of the fact reported in Hansson & Grüne-Yanoff 2011: §3.2 that a function based on Non-dominance is a choice function if and only if it is acyclic (there, choice functions, by definition, return non-empty alternative sets).
relations? I propose these are permitted alternatives, while those chosen for every preference relation are required alternatives. This captures the sense in which issuing an imperative !A can require and/or permit an alternative — the A-worlds — to be brought about. But can imperatives only permit and require the alternative(s) they promote, or can they reach further? After two successive commands, *Sing Alice!* and then *Dance Bob!*, it is required that Alice sing and required that Bob dance. But it is also required that Alice sing and Bob dance. In other words, it seems that if A is required and B is required (by the same authority), then $A \land B$ is required. After all, if you are required by law to pay your taxes and you are required by law to pay your bills, then you are required by law to pay your taxes and your bills. This will be important below since I will analyze imperative consequence in terms of dynamically preserving permission and requirement (§3.6). It seems plausible that I can infer $(A \land B)$ from !A and !B. And so it seems like the conjunctive closure of requirement is not something that can be ignored here. It also seems plausible that requirements are closed under disjunction — if A is required and B is required then $A \lor B$ is required. But disjunctive imperatives are not analyzed below as promoting a disjunctive alternative, so this is a less pressing issue to settle. It is worth noting that permissions are quite clearly not closed under conjunction: you are permitted to vote for a Republican presidential candidate and you are permitted to vote for a Democratic presidential candidate, but you are not permitted to vote for both (even though it’s perfectly possible for you, through fraud, to vote for both). While I think it likely that permissions are closed under disjunction — if A is permitted and B is permitted, then $A \lor B$ is permitted — this issue can also be set aside here because it does not bear on any of the inferences discussed. One final point that must be made about permission and requirement. Imperatives can only grant permission and convey requirements in certain contexts. It is only when the addressee is expected to adopt the preferences introduced by an imperative that they can actually be expected — rather than just be expected for the purposes of the conversation — to pursue the alternatives those preferences promote. This essential to requirements: if the addressee isn’t actually expected (in the deontic sense) to do act on them, then they aren’t required to do it. Merely promoting alternatives in what’s mutually preferred for the sake of the conversation does not accomplish this. An additional social expectation about how the addressee’s actual preferences will change is needed.

**Definition 5 (Evaluative and Deontic Concepts)** For any preference state $R$,

1. $a$ is a **good choice** in $R$ — $a \in Good_R$ — just in case $\forall r \in R: a \in cl_n(Ch(r))$
   - $cl_n(\{a_1, \ldots, a_n\}) = \{a_1, \ldots, a_n\} \cup \{x \mid x = a_1 \cap \cdots \cap a_n, \text{ for some } n \geq 2\}$, where $Ch(r) = \{a_1, \ldots, a_n\}$

2. $a$ is an **okay choice** in $R$ — $a \in Okay_R$ — just in case $a \in Good_R$ or $\exists r \in R: a \in Ch(r)$

---

29 Issuing an imperative *can* require or permit an alternative, but may not. When the alternative it promotes is dominated, that alternative will not emerge as required, and may not even be permitted. 30 Note that this does not result in Ross’s Paradox since that crucially involves introducing disjuncts that are not even permitted, let alone required.
3. \( Y \) is an **authority** over \( X \) with respect to \( a \) in \( R \) — \( \text{Auth}(Y, X, a, R) \) — just in case it is common belief among \( X \) and \( Y \) that \( X \) will privately adopt any preferences with respect to \( a \) introduced by \( Y \) into \( R \).

4. \( a \) is **required** in \( R \) for \( X \) by \( Y \) just in case \( a \in \text{Good}_R \) and \( \text{Auth}(Y, X, a, R) \).

5. \( a \) is **permitted** in \( R \) or \( X \) by \( Y \) just in case \( a \in \text{Okay}_R \) and \( \text{Auth}(Y, X, a, R) \).

This is not a full or final analysis of permission and requirement. But the necessary refinements, like specifying completely the algebras of requirement and permission (or good and okay choices), will make the definition apply to more alternatives, not fewer. This preliminary, more restrictive, definition which covers all the cases in play here is an adequate starting point. It is also worth noting that permission and requirement, like their corresponding nouns and preference, are gradeable. That could easily be accommodated in a more sophisticated version of the present proposal by using expected utility instead of preference. The most important application of Definition 5 here will be to imperative consequence. Towards that purpose, it will be useful to define the notation \( \text{Ch}(R) \). This will capture all constraints on agents’ choices in \( R \).

**Definition 6 (Choices Available in \( R \))** For any preference state \( R \), \( \text{Ch}(R) = (\text{Good}_R, \text{Okay}_R) \)

Before introducing that notion of consequence I should get around to presenting the semantics of imperatives for which it is designed.

**3.3 A Dynamic Preference Semantics**

My proposal about the dynamics of imperatives was that they change the conversational state by introducing a preference that promotes an alternative. But when that proposal was made in §3.1 I spoke neutrally about whether this gave the semantics of imperatives, or a pragmatically driven process that exploited a familiar semantics that pairs an imperative with its static content. It is time to drop this transparent subterfuge: the semantics of imperatives and its dynamics are one and the same. The meaning of an imperative \( !A \) is a function that takes one conversational state and returns another with an added preference for the live \( A \)-worlds over the the live \( \neg A \)-worlds. On this model, the meaning of a sentence is a function that maps a conversational state \( R \) to another one \( R' \). As argued in the introduction, this identification is not arbitrary. A static preference semantics cannot account for the mixture of moods underneath connectives, at least not without identifying the compositional meaning of an imperative with a proposition. As I will argue in §4.1, neither can a static property semantics.\(^{31}\)

Even the basic statement of the semantics above raises a preliminary issue: do imperatives really come tagged with an imperative morpheme/operator? In many languages they do (Aikhenvald 2010) and in others there are distinctive intonation patterns (Aikhenvald 2010: §3.1). For English, syntacticians have generally held that imperatives contain an unpronounced imperative element IMP high in the clause (see van der Wurff 2007: §3.2), though the structure of this clause is debated (Potsdam 1998,

\(^{31}\) Indeed, I argue even a dynamic property theory cannot explain the data from §2.
There seems to be little consensus on whether or not English imperatives have a distinctive intonation (e.g. Cruttenden 1997: 160), let alone a semantically significant one; but this possibility is not forgone. Setting these important issues aside, it is at least clear that formulating my semantics in a way that exploits an imperative marker is not a commitment that others have rejected or even refrained from making. However, note that the meaning I assign to imperative mood could also be encoded as a structural rule of interpretation, like predication, or divided between different sources.

On the dynamic imperative semantics described above, !A changes \( R \) by adding a preference for live A-worlds over live non-A-worlds. Since \( R \) is a set of info relations, this involves adding to a new preference each info relation \( r \in R \). This semantics, applied to an atomic imperative, can be stated in update semantics format (Veltman 1996):

**Basic Imperative Semantics**

Where \( \alpha \) is an atomic radical and \( \overline{a} = i_r - a \),

\[
R[!\alpha] = \{ r \cup \{(a, \overline{a})\} \mid r \in R \& a = i_r[\rho] \}
\]

What are \( A \) and \( i_r[A] \)? \( A \) is the original sentence minus its mood; a propositional radical (Wittgenstein 1953: §22n). It is not a well-formed sentence, but as a sub-sentential constituent it still has a semantics. It operates just on information \( i_r \) because it is the informational core of the sentence. But it is not a ‘move in the language game’ because it doesn’t operate on \( R \). Information is modeled in terms of possible worlds, and for convenience possible worlds are treated as functions that map every radical to a truth-value. A radical’s semantic role is to eliminate worlds where it’s false:

**Basic Radical Semantics**

For any atomic radical \( \alpha \), \( i[\alpha] = \{ w \in i \mid w(\alpha) = 1 \} \)

Letting !A be Kiss Alice! and !B be Kiss Bob!, set each loose, in sequence, on a state containing one info relation that excludes no worlds and contains no questions or preferences: \( R_0 = \{ \{(w_{AB}, w_{Ab}, w_{aB}, w_{ab}), \emptyset\} \} \), on the far left in Figure 5. \( R_0[!A] \) is:

**Figure 5**

Start in \( R_0 \), update with !A, then update with !B: \( (R_0[!A])[!B] \)

\[
R_1 = \{ \{\{w_{AB}, w_{Ab}, w_{aB}, w_{ab}\}, \emptyset\}, \{\{w_{AB}, w_{Ab}\}, \{w_{aB}, w_{ab}\}\} \}\}
\]

This semantics is incomplete because it treats the radical as an atomic symbol rather than building it up, e.g. from a determiner and verb phrase. But just as in propositional logic, this simplification will facilitate exploring enough phenomena to be of interest.
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!B takes this result as its starting point and introduces a third preference:

\[ R_2 = \{ \{ \{ w_{AB}, w_{Ab}, w_{aB}, w_{ab} \}, \emptyset \}, \{ \{ w_{AB}, w_{Ab} \}, \{ w_{aB}, w_{ab} \} \}, \{ \{ w_{AB}, w_{aB} \}, \{ w_{Ab}, w_{ab} \} \} \} \]

What does this result mean? To answer this question, apply the ideas from §3.2. They predict that in \( R_3 \) rational interpreters will see orange and yellow, as well as their intersection, as good alternatives. This means that kissing Alice, kissing Bob and kissing both are good alternatives in \( R_3 \). All three are also okay. If \( R_3 \) is a deontic state involving an appropriately authoritative speaker, then these three alternatives will be required and permitted. These intuitively plausible predictions inspire enough confidence to formulate the semantics in its full generality. The imperative operator should not only apply to atomic radicals, but also radicals built from atomics and connectives. In doing so, it is necessary to consider disjunction carefully.

In update semantics, disjunction is an ‘information union’, i.e. the union of parallel updates with each disjunct: \( i[A \lor B] = i[A] \cup i[B] \). Combining this semantics with the above imperative semantics predicts that, when issued by an authority, \( ! (A \lor B) \) requires and permits exactly one alternative: the union of the A-worlds and B-worlds. This is wrong. Disjunctive imperatives permit the alternatives corresponding to each disjunct. If an authority issues (34a), I may privately infer (34b).

(34)  a. Kill Bill or Budd!
       b. I may kill Bill.

The information union analysis could try to explain this in one of two ways. The first way is to make the semantics of may a bit less demanding than requiring its scope to be a permitted alternative. Perhaps May(\( \phi \)) only requires that the \( \phi \)-alternative entails, or are consistent with, some okay/permitted alternative. The second way is to have May(\( \phi \)) require the \( \phi \)-worlds to be an okay/permitted alternative, but modify Definition 5 what it is to be such an alternative. The modification needed would be: if \( a \) is an okay choice and \( \emptyset \neq a' \subset a \), or maybe just \( a' \cap a \neq \emptyset \), then \( a' \) is an okay choice. Any version of either explanation has an absurd consequence: if A is permitted, then May(A \& B), i.e. worshipping Jesus is permitted, so I may worship Jesus and Satan. Fortunately, there is an alternative semantics for disjunction.

Much recent work on disjunction in declaratives has experimented with the idea that disjunction does not form a disjunctive alternative, but rather a set of alternatives consisting of one alternative for each disjunct (Simons 2005, Alonso-Ovalle 2006, Groenendijk 2009, Mascarenhas 2009). This idea can be applied here by maintaining that radicals don’t just operate on information, they operate on alternatives. This requires a semantics where radicals update an alternative set \( A \) instead of set of worlds \( i \). But their basic function remains the same: \( \alpha \) will simply go through each alternative in \( A \) and eliminate the worlds where it is false.

\textbf{Definition 7 (Atomic Radical Semantics)} For \( A \subseteq \mathcal{P}(W) \) and any atomic radical \( \alpha \),

\[ A[\alpha] = \{ \{ w \in a \mid w(\alpha) = 1 \} \mid a \in A \} \]

The basic imperative semantics above needs two subtle modifications.
Definition 8 (Imperative Semantics) Where $\rho$ is any radical and $\overline{a} = i_r - a$, $R[|\rho|] = \{r \cup \{(a, \overline{a})\} \mid r \in R \& a \in \{i_r\}[\rho]\}$

On both this and the ‘basic’ imperative semantics, each info relation $r \in R$ is extended with a $(a, \overline{a})$ preference meeting some condition. Previously, this condition was that $a = i_r[\rho]$, so there is just one extension of $r$: the preference $(i_r[\rho], i_r - i_r[\rho])$. But in Definition 8 the condition is that $a \in \{i_r\}[\rho]$ so there will be one extension of $r$ for each alternative in $\{i_r\}[\rho]$. How could $\{i_r\}[\rho]$ end up with multiple alternatives in it? By Definition 7, atomic radicals never change the number of alternatives. They just filter each existing one. The second modification of Definition 8 is of note here: it applies to radicals of arbitrary complexity, i.e. radicals built from atomics, negation, conjunction and disjunction. Radicals containing disjunction are the ones that introduce alternatives.

![Diagram]

Figure 6  Updating with !(A \lor B)
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alternative is a good choice and according to the other, the yellow is a good choice. This means both are okay, and perhaps permitted, choices in $R_1$. This was the prediction sought above. It is worth noting that this is exactly the same update that results from $!A \lor !B$. But there is much more to Definition 9 than clauses 2 and 5.

Connectives operate not just on radicals but on sentences, which consist either of a radical combined with a mood operator $(\rho, \triangleright \rho, ?\rho)$ or conjunctions and disjunctions built from these basic sentences. While there are technically separate clauses for the connectives when they connect radicals and sentences, there is no ambiguity being posited here. The connectives do the same thing in both cases, they just operate on different kinds of sets. It is possible to have just one clause for both occurrences of the connectives by quantifying over types, e.g. for any $X$ and $X'$ that are sets of worlds or preference states: $X[\varphi] = X'$, where $\varphi$ is a radical or a sentence. Sentential conjunction has, in effect, already been illustrated. It amounts to sequential update and I already illustrated that $(R[!A])[!B]$ (see Figure 5) behaves as a conjunction of imperatives should: it makes the $A$-worlds, the $B$-worlds and the $A \land B$-worlds good choices. I will return to the relation between $!A \land !B$ and $(A \land B)$ in §3.6. Despite looking identical, clauses 3 and 6 for negation behave quite differently. Clause 3 does something familiar for negation: it eliminates worlds where its scope holds. Clause 6 does something else entirely: it eliminates any preferences that have been added, or changed, by its scope. An explicit semantics for declarative and interrogative mood helps to see what this amounts to.

**Definition 10 (Declarative Semantics)** Where $a_\rho = \cup(\{a\}[\rho])$

$R[\triangleright \rho] = \{\{a_\rho, a'_\rho\} \neq \emptyset \mid \exists r \in R: \langle a, a'\rangle \in r \& a_\rho \neq \emptyset\}$

- Filter the alternatives in each info relation with $\rho$, throwing out pairs that would promote $\emptyset$ and eliminating any info relations that would contain only these pairs.

**Definition 11 (Interrogative Semantics)** Where $\overline{a} = i_r - a$

$R[?\rho] = \{ r \cup \{\langle a, \emptyset\rangle, \langle \overline{a}, \emptyset\rangle\} \mid \exists r \in R: a \in i_r\{\rho\}\}$

- Add a question consisting of each $\rho$-alternative and its complement.

If $\triangleright \rho$ eliminates any worlds, $\neg \triangleright \rho$ will effectively return them to the alternatives they were excluded from. If $a$ is a $\rho$-alternative in $r$, then $?\rho$ will introduce a question $\{a, \overline{a}\}$ into $r$. $\neg ?\rho$ will effectively remove each of these questions. So, in short, the negation defined in clause 6 is a ‘rejection’ operator. I have included this clause for parity, but I think it is far from clear that any natural language negation is interpreted this way.

33 Note that the disjunctive alternative is not a good choice/requirement in $R_1$. I'm unsure whether this is a problem. If it is, perhaps it is because okay choices are exhaustive in the sense that their union is a good choice, i.e. it's required that one of the permitted alternatives obtain. This would amount to modifying Definition 5.1 and involve mutually recursive definitions of good and okay choices. Alternatively, one might try to derive this exhaustivity effect pragmatically.

34 This can be carried out in a compositional system with polymorphic type theory (e.g. Milner 1978).

35 $a_\rho \neq \emptyset$ ensures that accepting $\triangleright A$ doesn’t result in promoting $\emptyset$ just because $A$-worlds are promoted in some $r \in R$. The restriction $\{\{a_\rho, a'_\rho\}\} \neq \emptyset$ applies to $r$ that would only promote $\emptyset$ after its $\neg \rho$-worlds are eliminated. Also note that this definition of the declarative operator collapses alternatives. To have declarative disjunctions introduce alternatives, a more complex semantics is needed:

$R[\triangleright \rho] = \{\{a_\rho, a'_\rho\} \neq \emptyset \mid \exists r \in R: \langle a, a'\rangle \in r \& a_\rho \in \{a\}[\rho] \& a'_\rho \in \{a'\}[\rho] \& a_\rho \neq \emptyset\}$
and I am skeptical that negation never scopes semantically over sentential mood. I will assume that $\neg ! \rho$, $\neg ? \rho$ and $\neg \triangleright \rho$ are ill-formed, and that negation operates on radicals.

I am now in a position to offer explanations of the three observations from §2. The dynamic preference semantics for imperatives, declaratives and connectives just presented can explain how imperatives can scope under connectives and mix with declaratives (§3.4). When supplemented with the pragmatic framework from §3.2, this semantics can also account for the fact that imperatives, despite their non-informational meaning, interact with information (§3.5) and bear consequence relations (§3.6).

### 3.4 Observation 1: Connectives and Mixed Moods

The observation from §2.1 was that imperatives not only scope under conjunction, disjunction and conditionals. These connectives also allow imperatives to mix with declaratives, all while having their familiar meanings. The semantics above can explain how this feat, unexpected on truth-conditional analyses of the connectives, is possible. I will begin with conjunction and disjunction, and then turn to conditionals. After that, I will describe the promise of this semantics for explaining the conditional readings of conjunctions and disjunctions mentioned in §2.1.

Conjunctions like (6), aired in §2.1, have a meaning that is captured by the analysis of conjunction as sequential update.

(6) I'm going home and don’t (you) try to stop me!

Where $G$ is *I’m going home* and $S$ is *You try to stop me*, (6) has the form $\triangleright G \land \neg ! S$. As

\[
R[\triangleright G \land \neg ! S] = (R[\triangleright G])[\neg ! S]
\]

Figure 7 depicts, $\triangleright G \land \neg ! S$ first provides information and then promotes the remaining $\neg S$-worlds. Both the imperative and declarative constituents are allowed to have their distinctive effects. This is the virtue of the dynamic analysis of conjunction that was difficult to secure on a static analysis where connectives operate on contents. But as I argued in the introduction, the best case for the dynamic analysis comes not just from this success. It is a simultaneous and parallel success with disjunction.

Analyzing disjunction as parallel update captures the fact that (13a) neither commands that you put back *Waverly*, nor asserts that I will put back *Naked Lunch*.

(13a) Put back *Waverly* or I’ll put back *Naked Lunch*. (I don’t care which.)
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But it also captures the fact that this utterance is not inert: it promotes your putting back *Waverly* enough to make it an okay choice and brings to salience the possibility of me putting back *Naked Lunch*, as depicted in Figure 8. A disjunction of imperatives

\[ \triangleright W \lor \neg N \]

Figure 8  Updating with \( \triangleright W \lor \neg !N \)

\( !A \lor !B \) is also smoothly interpreted. It is equivalent to the already discussed case of \( \neg (A \lor B) \), generating two preference relations, one promoting \( A \), the other \( B \); see Figure 6.

The goal of this paper was to emphasize and explain the non-conditional readings of mixed conjunctions and disjunctions. Nonetheless, it would be unsatisfying if there was little promise to extend the present account to the more well-studied conditional readings. To illustrate this promise, I will show that the readings themselves are representable, and that they can be derived by the most promising routes being explored in the literature.\(^{36}\) Before doing so, I will present an analysis of conditional imperatives in the current framework. The account of conditionals at the heart of this analysis will provide one clear model of what a conditional reading of conjunctions and disjunctions might amount to in the present framework.

3.4.1 Conditional Imperatives

Recent work in dynamic semantics has revived interest in a strict conditional analysis (Veltman 1986, 2005, Gillies 2007, 2009, 2010, Starr to appear). At the core of these various proposals is something like the following semantics.

**Dynamic Strict Conditional**

\[ i[(if \phi) \psi] = \begin{cases} 
  i & \text{if } i[\phi][\psi] = i[\phi] \\
  \emptyset & \text{otherwise}
\end{cases} \]

It tests that the consequent is supported in the substate where the antecedent has been added, i.e. that all of the \( \phi \)-worlds in \( i \) are \( \psi \)-worlds. Developing this core idea in a

way that explains how conditionals are informative, how implausible logical features of previous strict analyses can be avoided and how it can be integrated into a general theory of modality involves several complications that would take me too far afield here. It would be contentious indeed to claim that this is best theory of conditionals on the market. But it is certainly a promising research program and it is in that spirit that I explore its application to the analysis of conditional imperatives here.

To adapt the dynamic strict conditional semantics to a language where the consequent may be an imperative or interrogative, conditional updates must be defined on $R$ instead of $i$. However, imposing a test that just returns $R$ does not capture the fact that conditional interrogatives and imperatives change the issues and preferences of the conversation. This problem is solved by having the conditional impose the same test as before, but having successful tests return a modified state rather than $R$. Since imperatives and interrogatives never provide information, they will always pass this test: updating with the consequent after updating with the antecedent will never provide more information. The trick is to find a modified state that works for declarative, imperative and interrogative consequents alike. This is accomplished by extending each $r \in R$ with the preferences or alternatives introduced by updating with both $\phi$ and $\psi$.

**Definition 12 (Conditional Semantics)**

$$R[(\text{if } \phi) \psi] = \begin{cases} \{r \cup \{r\}[\phi]\} & | r \in R \\ \emptyset & \text{otherwise} \end{cases}$$

On this definition, a successful test returns $\{r \cup \{r\}[\phi]\}$. For declarative $\psi$, the only difference between $r$ and $\{r\}[[\phi][\psi]]$ will be a preference for the $\phi \land \psi$-worlds over $\emptyset$. Since the test requires that all $\phi$-worlds in $i_R$ are $\psi$-worlds, this preference will only be introduced when there are no $\phi \land \neg \psi$-worlds. For imperative $\psi = !\rho$, the only difference between $r$ and $\{r\}[[\phi][\psi]]$ will be a preference for the $\phi \land \rho$-worlds over the $\phi \land \neg \rho$-worlds. For interrogative $\psi = ?\rho$, the only difference between $r$ and $\{r\}[[\phi][\psi]]$ will be a preference for the $\phi \land \rho$-worlds over $\emptyset$ and a preference for the $\phi \land \neg \rho$-worlds over $\emptyset$. Focusing on conditional imperatives, what does this prediction amount to? Does it change the choices available? The short answer is no. Back in §3.2, Definition
6 said that the good alternatives in \( r \) are a subset of the alternatives promoted in \( r \). In motivating Definition 2.3, I noted that an alternative is intuitively promoted only when it covers all the live possibilities in \( r \). Which choices are available to an agent in \( R \) is determined by which alternatives are good in each \( r \in R \) (Definition 6). Since the preferences introduced by conditional imperatives don’t cover all the live possibilities, they therefore fail to change which choices are available to the agent. It might seem like this is wrong, since many conditional imperatives, such as *if you see Abita, give her a hug!* seem to imply that the consequent is okay or permissible. But as Charlow 2013: §2.3 observes, conditional imperatives cannot make their consequent permissible because of examples like (35b) — inspired by Forrester’s (1984) Paradox.

\[(35) \quad \begin{align*}
    a. & \text{ Don’t hit me!} \\
    b. & \text{ But if you hit me, hit me softly!}
\end{align*}\]

As I will discuss in §3.5, the current theory of conditional imperatives predicts this while predicting that uttering \((\text{if } \phi) \text{!} \rho\) and \((\text{if } \phi) \text{!} \neg \rho\) is irrational: it leads to cyclic preferences.

I conclude this section by noting that this semantics also adequately captures the conditionals with mixed consequents mentioned in §2.1:

\[(17) \quad \text{If Chris tries to leave, I’ll distract him and you close the door!}\]

The semantics predicts that this sentence excludes worlds where Chris leaves and I don’t distract him, and among the worlds where Chris leaves, there is a preference for the worlds where you close the door. Capturing this meaning without positing significant covert material or a wide-scope imperative operator makes the current analysis unique (e.g. Kaufmann & Schwager 2009, Charlow 2010).

### 3.4.2 Conditional And’s and Or’s

Now that there is at least a clear model of a conditional meaning on the table, it is worth returning to examples like (1)-(3) mentioned in §2.1.

\[(1) \quad \text{Fly to Harare and I’ll meet you there.}\]
\[(2) \quad \text{Piss off a Texan and you'll be sorry.}\]
\[(3) \quad \text{Move to Portland or you'll never relive the 90s.}\]

Does the present account present any promise for these kinds of analyses? It does. To illustrate this, I’ll briefly discuss which extant theories are best and comment on how they could fit into the present framework. Examples (1) and (2)/(36) differ in that the imperative of (1) still has directive force — or at least that’s one salient interpretation — while the imperative in (2)/(36) does not.

\[(36) \quad \text{Open the Guardian and you'll find a picture of the Queen}\]

The interpretations with no directive force I call **pure conditional** interpretations, while those with directive force I call **mixed conditional** interpretations. I will argue that there are three theories are adequate for the known data:
• The **divided theory**: there are two different *and's* in (1) and (36), *and* and _LS and_ (‘left-subordinating *and*' Cullicover & Jackendoff 1997) corresponding to the two interpretations, and mixed conditional interpretations are derived as modal anaphora (Kaufmann 2012)

• The **unified and theory**: directive force is pragmatically weakened in pure conditional interpretations (Asher 2007, Lascarides & Asher 2003: §4.1)

• The **unified _LS and_ theory**: since _LS and_ neutralizes directive force, it must be pragmatically strengthened in mixed conditional interpretations (Franke 2005, von Fintel & Iatridou 2009, 2012)

The will require defending the divided theory from the criticism that modal anaphora between imperatives and modals is not possible in conjunctions (von Fintel & Iatridou 2009, 2012). I will then propose that the negative conditional interpretation of mixed *or's*, like 3, arises from modal anaphora in the second disjunct to the complement of the possibility introduced by the first disjunct, together with pragmatic reasoning based on the undesirability of the second disjunct.

For pure conditional readings, some analyses aim to neutralize the imperative’s force by pragmatic reasoning based on the second conjunct’s undesirability (e.g. van der Auwera 1986). But as (36) shows, the undesirable second conjunct is inessential (Bolinger 1967, Davies 1986). Russell 2007 proposes that pure conditional interpretations arise from a bare VP in the first conjunct rather than a true imperative, but this hypothesis is insufficiently general. These interpretations exist even in languages where the first conjunct is explicitly marked for imperative mood, as Jespersen 1965314 noted for German (von Fintel & Iatridou 2012). Another option in the literature is the ‘directive neutralizing’ view defended by Han 1998: §5.4.3.3, Clark 1993: §4 and Lascarides & Asher 2003: §4.1. On this view, a morphosyntactic (Han) or pragmatic (Clark, Lascarides & Asher) process particular to these uses allows the directive component of the imperative to be ‘neutralized’. Han’s neutralizing process appeals to the unmarked nature of English imperatives, so it fails to be sufficiently general (von Fintel & Iatridou 2009). Clark’s is limited to cases where the imperative promotes a potentially desirable alternative. As (37) illustrates, this is also insufficiently general.37

(37) **One dispassionate statistical epidemiologist to another:**

Catch the flu and the contraction rate will reach 15%

Lascarides & Asher’s (2003) dynamic approach based on discourse relations fairs better. On their view, in pure conditional interpretations the imperative and the declarative bear a discourse relation to each other called _Def-Consequence_. But in mixed conditional interpretations a different relation, called _Explanation*,_ obtains. _Def-Consequence_ is non-veridical in the sense that it evaluates what the second conjunct would say in a context where the directive has been carried out, much like a conditional. But _Explanation*_ is veridical. Since this analysis only requires one meaning for *and, it is a unified _and_*

37 Clark (1993: §5) tries to argue that cases similar to (37) do not contain real imperatives, but all the features mentioned are shared with (36)/(2). (My (37) lacks most of those features for good measure.) Clark also offers no explanation of how the special interpretation process is triggered.
theory. While work on discourse relations is still in its early stages, this approach would integrate nicely with the current one. But pure conditional interpretations have also been analyzed as arising from a different connective altogether. This other connective, called $\textsc{ls}and$, is useful for data outside of imperatives (Culicover & Jackendoff 1997), so a divided $\textsc{and}$ theory is not a simple ambiguity theory. Since $\textsc{ls}and$ receives a conditional interpretation, it neutralizes the antecedent’s directive force, much as a normal conditional does not actually eliminate worlds where the antecedent doesn’t hold. But unified $\textsc{ls}and$ theories have been motivated by a criticism of how divided $\textsc{and}$ theories analyze mixed conditional interpretations. As first proposed by Han 1998: Ch.5, it is tempting to analyze mixed conditional readings in terms of modal anaphora (or modal subordination). Modals make their scope proposition available for subsequent modals, e.g. **Matthew might buy that stereo. His neighbors would need earplugs.** Perhaps imperatives are similar in that they make the alternative they promote available for subsequent modals (and perhaps imperatives). This seems to predict that imperatives will pattern like modals with respect to their anaphoric continuations. But:

(38)  
| a. Invest in this company! You will become rich.  
| b. You must invest in this company! You will become rich. |

(von Fintel & Iatridou 2012)

(39)  
| a. Invest in this company and you will become rich.  
| b. # You must invest in this company and you will become rich. |

(von Fintel & Iatridou 2012)

They conclude that modal anaphora is not possible across conjunction and use this to cast doubt on using that mechanism to explain (39a). It is worth noting that the unified $\textsc{and}$ theory of (Asher 2007, Lascarides & Asher 2003: §4.1) makes use of discourse relations that license modal anaphora, so this would also be a problem for that approach. But I do not believe the outlook is so bleak for the modal anaphora approach. Intuitively, (38a) says your being rich will temporally follow your investing. That this provides a reason to invest is left up to common sense. By contrast, (38b) says that becoming rich is the reason why you must invest. The second sentence explains why the modal claim was issued. Examples lacking this asymmetry don’t exhibit the contrast in (39).

(40)  
| a. Contact your superior! She will explain your new mission.  
| b. You must contact your superior! She will explain your new mission. |

(41)  
| a. Contact your superior and she will explain your new mission.  
| b. You must contact your superior and she will explain your new mission. |

38 Kaufmann 2012: §6.3.1 is a helpful survey of the linguistic differences between mixed conditional (‘Type I’) and pure conditional (‘Type II’) interpretations.

39 In the framework here, $\textsc{ls}and$ could be given the following semantics: it tests that every alternative promoted by the first ‘conjunct’ entails, together with the contextual information $i_R$, the second ‘conjunct’. More formally: $R[\rho_{\textsc{ls}} \land \psi] = \{ r \in R | \forall r' \in \{ r \} [\rho], \forall a \in (P_r - P_r): a \subseteq i_R[\psi] \}$. 

Naturally occurring examples of these conjunctions include:

(42) As you enter this program you must be open-minded and objective and you will soon learn of all the doors that social work can open for you.

(43) To serve as a commissioner you must take an open book test and you will be eligible to work at the polls during the current term of the Clerk of Court.

In (40), you don’t necessarily have to contact your superior because she will explain your new mission—it could just be protocol. Note the second sentence allows the insertion of also, unlike (38). Similarly, in (43) you don’t have to take a test because you will be eligible to work at the polls. You have to take the test because that’s the law. Conjunction generally prohibits the right conjunct from explaining the left conjunct:

(44) a. Gabe is not allowed in the tent. He will get it dirty.
   b. # Gabe is not allowed in the tent and he will get it dirty.

What the data here do confirm is that the modal anaphora approach must be sensitive to the discourse relations at work, just as the unified and theory in (Asher 2007, Lascarides & Asher 2003: §4.1). While there is much more to be said about the modal anaphora approach, I conclude that it is still a promising tool for understanding conditional and’s. Since the current analysis is compatible with each leading theory of conditional and’s, its advances on other interpretations of connectives count as a strict improvement.

The analysis I will sketch for conditional or’s like (3) is inspired by observations about anaphora in disjunctions.

(3) Move to Portland or you’ll never relive the 90s.

(46) There’s no bathroom in this building or it’s in a funny place.

(47) Sam’s in his office or he must be at the beach.

Each of these disjunctions $\phi \lor \psi$ is intuitively equivalent to $\phi \land (\text{if } \neg \phi) \psi$. What seems to be going on, is that the second disjunct is anaphorically restricted to the complement of the alternative presented in the first disjunct. The most elegant way to capture this would be to have disjunction defined as above, but allow for the idea that connectives store various pieces of information that can be retrieved by anaphoric elements. One such model is provided in Kaufmann 2000, where sentences are interpreted with respect to a stack of contexts. The actual presuppositions of the conversation are always the top element of the stack. Subsequent elements are introduced and targeted by modal

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42 To control for the fact that and prefers temporal order, I’m using a verb whose application can be explained by its consequences rather than its causes. It is an important and interesting feature of modal verbs that they have this property.

43 von Fintel & Iatridou (2012) also observe that polarity switch is possible across sentence breaks, but not and. Polarity switch on the present account is complement anaphora, and this is a general, explainable feature of complement anaphora (Nouwen 2003):

(45) a. Few congressmen admire Kennedy. They think he’s incompetent.
   b. # Few congressmen admire Kennedy and they think he’s incompetent.
language that entertains potential enrichments of those presuppositions. On this model, disjunctions would introduce a sub-context with the complement of the alternative introduced by the first disjunct. Combined with the amendment, already needed above, that imperatives introduce their preferred alternative, this could explain how the second disjunct in (3) receives its negative conditional interpretation: the necessity modal will is anaphorically restricted the alternative of you not moving to Portland, much like must in (47). How, given the semantics for disjunction above, will this predict that the first disjunct has directive force when it’s an imperative? There are two key assumptions needed to predict this. First, the negative conditional interpretation of the second disjunct, on the conditional semantics from §3.4.1, requires that all of the worlds in \( i_R \) where you don’t move to Portland, you don’t relive the 90s. So, letting \( P \) be you move to Portland and \( N \) be you relive the 90s, the negative conditional meaning of the second disjunct requires that in the input state \( R \) there are no \( \neg P \land N \)-worlds. Second, it must be common ground in the context that you prefer reliving the 90s to not. These two facts imply that \( !P \lor \triangleright\neg N \) is interpreted as \( !P \land (if \neg P) \triangleright\neg N \) only when issued in a state like \( R_0 \) in Figure 10. In \( R_1 \), it has not only been affirmed that you won’t relive the 90s if you don’t move to Portland, but the alternative of going to Portland and reliving the 90s has been promoted to being a good, perhaps required, alternative. Nothing

![Diagram](image)

**Figure 10** A Negative Conditional Disjunction

would change, in terms of which alternatives are good or okay, if one followed the disjunction with Move to Portland and relive the 90s! But there’s a salient objection: this analysis assumes that before the disjunction is issued, moving to Portland is a good alternative. That’s not quite true, though. What is true is that reliving the 90s is a good alternative, and the negative conditional makes clear that the only way this alternative can be realized is for you to move to Portland. At this point, it becomes clear that the reliving-the-90s-alternative and the reliving-the-90s-and-moving-to-Portland-alternative are one and the same. It might also be objected that this analysis makes the imperative in the first disjunct kind of pointless. One could just say: if you don’t move to Portland, you won’t relive the 90s. But I fail to see the problem, just as I fail to see the problem that we would get the same result, in terms of which alternatives are good, if the disjunction was You are moving to Portland or you won’t relive the 90s. There are many equivalent ways of making clear that the same set of choices are available to the addressee.
3.5 Observation 2: Imperatives and Contextual Information

The second observation concerned the ways in which imperatives, despite being not truth-conditional, could depend on contextual information. Consider (18).

(18) a. # Unicorns don’t exist. Bring me a unicorn!
    b. # The door is open. Open the door!

These infelicities can be explained by the current approach to the semantics and pragmatics of imperatives. Let \( U \): unicorns exists and \( B \): you bring me a unicorn. There are no worlds which both lack unicorns and you manage to bring me a unicorn. So \( w_{ub} \) will not be a live possibility in \( R \). (18a) amounts to the update \( R[\triangleright \neg U][!B] \). The declarative

\[
\begin{array}{c}
\begin{array}{c}
& U_b \\
& U_b \\
U & & B \\
& \triangleright \neg U \\
& \longrightarrow \\
& !B \\
& \rightarrow \\
& u_b \\
& \text{ub}
\end{array}
\end{array}
\]

Figure 11 \( R[\triangleright \neg U][!B] \)

eliminates both \( U \)-worlds and thereby the only \( B \)-world. The preference introduced by \( !B \) is absurd: it promotes \( \emptyset \) over the \( \neg B \)-worlds. Such a preference state is irrational, by Definition 4 and Fact 1. After all, an agent making rational choices on the basis of the preference state could never bring it about. Thus, the utterance is infelicitous. (18b) can either be assimilated to this kind of case, or be given an alternative explanation. Suppose one had a more fine-grained analysis of alternatives that captured the fact that an imperative is supposed to involve not just a fact coming to be true, but the addressee making that fact true at some non-past time. Then in (18b), even though there are live worlds where the door is open, there are no live worlds where you bring that about. Thus, just like (18a), this imperative introduces an irrational preference. Alternatively, one could point out that the second sentence adds a vacuous preference for the open-door-worlds over the non-door-open-worlds. But then the imperative fails to achieve its characteristic conversational function: to promote an alternative and therefore to constrain the choices a rational agent can make. Further research is needed to decide between these explanations. But, there was more to the second observation.

Imperatives depend on contextual information in another way: what’s required can change when new information comes in. My earlier example involved accepting a command issued with (19), and then learning that one’s brother had taken out the trash.

(19) Take out the trash or wash the dishes!

There is a clear intuition that you are now required to wash the dishes. On the present analysis of disjunction, the command will create two kinds of preference relations: one
that promotes taking-out-the-trash-worlds and one that promotes washing-the-dishes-worlds. When one gets the information that there are no worlds where you take out the trash, the first kind of preference relation is rendered absurd, and so eliminated from consideration. The second becomes the one promoting an alternative, and hence by Definition 5 the only good choice will be to wash the dishes. This example illustrates the strong interdependence of requirements and information. But there is one dimension of the interdependence that has been, so far, left out.

In §2.2, I noted that neither (20) nor (21) are felicitous pairs of commands.

(20)  
  a. Marine, clean that latrine!
  b. #Don’t clean that latrine!

(21)  
  a. Marine, if you’ve never been on latrine duty, clean that latrine!
  b. #If you’ve never been on latrine duty, don’t clean that latrine!

It is clear that (20) presents an intuitively conflicted set of commands: there is no action that wouldn’t end up, or wouldn’t have lead to, violating one of them. This is captured on the present analysis: there is no alternative which a rational agent can choose to act upon given the preference introduced in (20). On the semantics given above, this pair of imperatives will lead to a state containing only preference relations like those in $R_1$, Figure 12—see also $r_3$ in Figure 4, §3.2. $R_1$ is irrational, by Definition 4 and Fact 1, since it is cyclic. But however one explains (20), this explanation must be combined with one that is appropriately sensitive to the fact that requirements change when new information comes in and treats conditionals as being about a hypothetical addition of information. (21) does not provide incompatible requirements, at least not in the same intuitive sense: there is an action that would have lead to not violating either of them, namely having performed latrine duty some time in the past. But, (21) will provide incompatible requirements if the information that you’ve never been on latrine duty comes in. An approach to requirement that is sensitive to this nuance is needed. The analyses of conditionals and requirement above meet these criteria and the pragmatic concepts defined in §3.2 render (21) infelicitous in the same way as (20): it is irrational. A glance at Fact 1 reveals that the preferences in $R_1$ are cyclic, just as in $R_0$. Deeming cyclic preferences irrational was motivated by more than intuition: they lead
even rational decision makers to irrational choices, i.e. pursuing no alternative despite preferring some to others, or pursuing incompatible or impossible alternatives.\footnote{I am indebted here to correspondence with Nate Charlow that pushed me to develop the present analysis. This is no mistake: Charlow 2013 also tackles examples like (20) and (21). The present analysis differs from that attributed to me and criticized in Charlow 2013: §5.6.2. While the present analysis is free of the defects highlighted there, this is in part to Charlow’s credit.}

### 3.6 Observation 3: Disjunction, Consequence and Ross’s Moral

The Generalized Ross’s Paradox required reconciling the different inferential behavior of imperatives and declaratives in disjunctions and conjunctions without postulating two connectives or entirely unrelated notions of consequence. From a dynamic perspective, consequence is the incremental preservation of a resource crucial to the conversation or deliberation, e.g. information. A definition of consequence that applies this idea to imperatives, together with the semantics above, solves this paradox. The key is to find the resource that is crucial when imperatives are involved. It is clear enough that information is a crucial resource when declaratives are used to converse and deliberate. Informational consequence can be formally defined as follows (Veltman 1996):

**Definition 13 (Informational Consequence)**

- $\phi_1, \ldots, \phi_n \models \psi \iff \forall R: i_R[\phi_1]\ldots[\phi_n] = i_R[\phi_1]\ldots[\phi_n][\psi]$.

$\psi$ is a consequence of some premises just in case accepting $\psi$ after accepting the premises never changes the contextual information.

The semantics and pragmatics above suggests a clear candidate: the resource crucial to imperatives is the **choices available** in a preference state $R$: $Ch(R)$, i.e. which alternatives in that state are good or okay choices (see Definition 6). Recall that $Ch(R)$ returns a pair of sets of alternatives $\langle Good_R, Okay_R \rangle$. Choice Consequence is exactly like informational consequence, but tracks the preservation of which choices are available rather than information. (I use ‘$\models$’ to distinguish it from informational consequence.)

**Definition 14 (Choice Consequence)**

- $\phi_1, \ldots, \phi_n \models \psi \iff \forall R: Ch(R[\phi_1]\ldots[\phi_n]) = Ch(R[\phi_1]\ldots[\phi_n][\psi]).$

$\psi$ is a consequence of some premises just in case accepting $\psi$ after accepting the premises never changes which choices are available.

Definition 14 predicts that (23b) is not a consequence of (23a).

---

(23) a. Post the letter!

b. Post the letter or burn the letter!

A counterexample is given in Figure 13, and the basic idea is simple. Disjunctions of imperatives, and disjunctive imperatives, change the choices available because they can make the alternative promoted in each disjunct an okay choice. So when one
A Preference Semantics for Imperatives

![Diagram of disjunction introduction]

Figure 13 Disjunction Introduction is not a Choice Consequence

moves from Post the letter! to Post the letter or burn the letter!, the second disjunct provides additional permission not granted by the premise. It is worth noting that this welcome result did not depend on the absence of a burn-and-post world. Suppose such a world had been present. Then it would have been included in the yellow and orange alternatives, and the orange alternative would still be a new okay choice introduced by the disjunction. Of additional interest is the fact that disjunctions and conjunctions are cleanly distinguished on this analysis: neither !A, !B, !A ∧ !B nor !(A ∧ B) is a consequence of !(A ∨ !B) or !(A ∨ B). However, both conjuncts are a consequence of !(A ∧ B). !(A ∧ B) is also a consequence of !(A ∧ !B), but the reverse does not hold. As observed in §2.3, certain examples of the inference from !(A ∧ B) have exactly the same structure as the inference from !(A to !(A ∨ B): !A permits more than !(A ∧ B). The example discussed in §2.3 was a case where it was commanded that Monica inject a snitch with poison and antidote, but it was not commanded that she inject a snitch with poison. Letting P: Monica injects the snitch with poison and A: Monica injects the snitch with antidote, Figure 14 illustrates that !P is not a consequence of !(P ∧ A). Just as a disjunction can introduce a new, more permissive alternative, moving from a conjunctive imperative to its conjunct can introduce a new, more permissive alternative. It was also observed in §2.3 that when Bernie calls to clarify and says Monica, don’t inject the snitch with poison! she should not infer Don’t inject the snitch with poison and antidote! Figure 15 illustrates that this inference is just like the last two in that the conclusion makes a more permissive alternative okay, but it is worse: it also makes that more permissive alternative good. In all of these cases, I’ve talked about alternatives being okay/permitted and some alternatives being more permissive. It is worth being a bit more explicit about what I mean when I talk this way. To act on an alternative means to select an action that does not depend on the differences between the worlds grouped together in the alternative. When I say an alternative a is more permissive than another a’, I just mean a includes a world that a’ does not. This implies that an agent acting on a could lead to a world that

\[ R_0 \{!P \} = R_1 \]

\[ \text{Ch}(R_1) = \{\{w_{bp}\}, \{w_{bp}\}\} \]

\[ R_2 \]

\[ \text{Ch}(R_2) = \{\{w_{bp}\}, \{w_{bp}\}, \{w_{bp}\}\} \]

45 This may not be obvious, since the conjunctive alternative is often not present in the state. However, consequence is defined in terms of \( \text{Ch}(R) = \langle \text{Good}_R, \text{Okay}_R \rangle \), and in Definition 5.1 Good\(_R\) is closed under intersection. So when the A-alternative and B-alternatives are good, so is the A ∧ B-alternative. As discussed in before Definition 5, this is independently motivated by observations about requirement.
acting on \( a' \) could not. It is this idea that’s at work above. The premises in each invalid inference are less permissive than the conclusion: the conclusions make actions okay which could realize worlds that are not contained in any okay choice by the premises. This stretching of permission is what makes the inferences bad.

This approach to consequence makes other notable predictions:

- **Notable Consequences:** \( \models !\rho \) (if \( \triangleright \rho_1 \) \( !\rho_2 \), \( \triangleright \rho_1 \models !\rho_2 \), \( \models !\rho_1 \vee !\rho_2 \), \( \triangleright \neg \rho_1 \models !\rho_2/1 \)

- **Notable Non-Consequences:** \( \neg !\rho_1 \), (if \( \triangleright \rho_1 \) \( !\rho_2 \), \( \triangleright \rho_1 \models \neg !\rho_1 \land !\rho_2 \), \( !\rho_1 \), (if \( \triangleright \rho_1 \) \( !\rho_2 \), (if \( \triangleright \neg \rho_1 \) \( !\rho_2 \), \( \triangleright \neg \rho_1 \models \neg !\rho_2 \land \neg !\rho_2 \)

While a full logical investigation will have to wait for another occasion, I hope to have shown that the system developed here merits such an investigation.
3.7 Truth

It makes sense to evaluate declaratives, or at least assertions of them, for truth. But it does not make sense to evaluate imperatives, or utterances of them, for truth. How exactly is this distinction captured on the present account? Often in dynamic semantics, truth is left behind for informational support: \( i \) supports \( \phi \) just in case the semantic effect of \( \phi \) returns the same state of information \( i \). The idea is that \( i \) supports \( \phi \) when the semantic information conveyed by accepting \( \phi \) is already implicit in \( i \). But truth is a useful concept too, and I believe it has an important role to play in semantics. My preferred definition of dynamic truth is this: \( \phi \) is true in \( w \) just in case accepting \( \phi \), when you have the information that \( \{ w \} \), returns the same information. The intuition is that \( \phi \) corresponds to the facts of \( w \) if you know all of the facts about \( w \) and the semantic information conveyed by \( \phi \) is implicit in that knowledge. In the present system, this means that \( \phi \) is true in \( w \) when \( i_{\{w\}}[\phi] = \{w\} \).

Following Frege (1918: 292-3), I assume that a sentence type is truth-evaluable just in case the question of truth can arise for its instances. The idea is that a sentence type is truth-evaluable when learning about the truth or falsity of one of its tokens is informative. The following definition attempts to capture this idea more precisely. A sentence type \( T \) is truth-evaluable just in case there exists a \( w \) where an instance \( \phi \) of type \( T \) is true and there exists a \( w' \) where \( \phi \) is false. Translating this to the dynamic setting: a sentence type \( T \) is truth-evaluable just in case there exists a \( w \) such that \( i_{\{w\}}[\phi] = \{w\} \) and there exists a \( w' \) where \( i_{\{w'\}}[\phi] = \emptyset \). Since imperatives only introduce preferences and never eliminate worlds, they are not truth-evaluable. By contrast, declaratives are truth-evaluable since they are capable of eliminating worlds.

4 Previous Analyses

4.1 The Property Analysis

On the property analysis, an imperative sentence denotes a property of the addressee. Properties are identified with the functions that typically serve as the denotation of predicates in formal semantics: functions which take individuals to functions from worlds to truth-values.\(^{46}\) Such a function is denoted by the expression of Ty2 (Gallin 1975) in (48a), and is the content of (48a).\(^{47}\)

\[
\text{(48) a. Leave!} \\
\text{b. } \lambda x.\lambda w.\text{Addressee}(x, w_c) \land \text{Leaves}(x, w)
\]

This function maps each individual \( x \) to a function which maps worlds \( w \) where \( x \) is both an addressee in the world of the context \( (w_c) \) and left in \( w \) to 1 (Hausser 1980: 84; Portner 2004: §3.1). This semantic analysis nicely captures the fact that imperatives cannot be evaluated for truth, and cannot be embedded in propositional

\(^{46}\) This captures the idea that a property is a distinction among individuals across worlds: there are those individuals and worlds which return 1 and then there are those individuals and worlds which don’t.

\(^{47}\) Following Church (1940: 58) brackets indicating the scope of \( \lambda \) are often omitted in favor of ‘.’ which means that the \( \lambda \) takes the widest scope consistent with well-formedness.
contexts like *John believes that...* or *It is not true that...*

This analysis also nicely captures the possibility of combining imperatives with coordinating connectives like *and* and *or*. These connectives can occur between predicates, e.g. *John ran and swam*. Since both imperatives and predicates denote properties, any reasonable semantic treatment of predicate coordination will translate into a theory of imperative coordination. The difficult cases for the property analysis are the data discussed in §2.1. Connectives that mix imperatives and declaratives cannot be captured by the basic property analysis.

(6) I’m going home and don’t (you) try to stop me!

(13) You put back *Waverly* or I’ll put back *Naked Lunch*

The two clause-types have different semantic types, so it should not be possible to conjoin or disjoin them. Further, even if one did combine them it is not clear what type this combination should have. Delivering a proposition obscures that a command is in play, and delivering a property obscures that a proposition is in play. On the other hand, just delivering a set of their uncombined components does not allow one to distinguish conjunction and disjunction. Conditionals also present a combinatorial problem. How can the consequent sometimes contribute a proposition and sometimes a property? The property theorist might treat (15) as denoting a conditional property.

(15) If Chris tries to leave, close the door!

But that would obscure the function of a declarative consequent in a mixed conditional.

(17) If Chris tries to leave, I’ll distract him and you close the door!

These combinatorial issues will resurface in Portner’s (2012) analysis of Ross’s Paradox. What does the property analysis say about imperative consequence? Extending classical entailment to properties is simple. It is property inclusion: ![ψ] is a consequence of ![φ] if every world and individual ![ψ] applies to, ![φ] also applies to. This account nicely predicts that ![φ] is a consequence of ![φ ∧ !ψ]. However, it also predicts ![φ ∨ !ψ] (or ![φ ∨ !ψ) to follow from ![φ]. Also, ![A] and ![B] will be a consequence of ![A ∧ B]. Portner 2012 aims to improve these predictions by connecting a theory of imperative consequence more tightly with an analysis of how imperatives update context. Portner 2004 proposes a tripartite model of discourse context ⟨CG, QS, TD⟩: Common Ground (CG), the set of mutually accepted propositions; Question Set (QS), the set of mutually accepted questions; To-Do List (TD), the function which maps each conversationalist to the set of properties it has been mutually supposed they are to make true. While declaratives add a proposition to CG and interrogatives add a question to QS, Portner proposes that imperatives add a property to the addressee’s section of TD. These context update potentials are not identified with the compositional meaning of a sentence. Instead, Portner (2004: §3.1, 2007: 358, 2012) proposes that they are either inferred from the standard content-level semantics of the three clause types or the result of a convention associating clause types with their characteristic context updates. TD is used to generate an ordering on the worlds compatible with CG. The basic idea is that \( w <_\alpha w' \) if \( w \) instantiates a strict subset of the properties that \( w' \) instantiates from \( \alpha \)'s TD. 48 This ordering is appealed to by a pragmatic principle:

48 Portner 2012: §2 writes \( w <_\alpha w' \) to mean that \( w \) is ranked over \( w' \), but I will opt for the opposite notation of Portner 2007: 358 that follows our use of ‘\( x < y \) as \( x \) is less than \( y \)’. 

42
Portner’s Principle For any agent $\alpha$, the participants in the conversation mutually agree to deem $\alpha$’s actions rational and cooperative to the extent that those actions in any world $w \in \bigcap CG$ tend to make it more likely that there is no $w' \in \bigcap CG$ such that $w <_\alpha w'$. (Portner 2004: §3.2, 2007: 358)

This connection between information and imperatives isn’t direct enough to predict:

(18) a. # Unicorns don’t exist. Bring me a unicorn!
   b. # The door is open. Open the door!

While both imperatives will fail to change any $<_\alpha$, Portner’s Principle does not predict this to be irrational. Further, this analysis does not predict that imperatives which fail to change the ordering will be in any way defective. The job of an imperative on this analysis is to add a property to TD, and both imperatives in (18) achieve this impeccably.

Portner’s (2012: §4.1) approach to Ross’s Paradox combines an alternative semantics for disjunction with a dynamic consequence relation for imperatives. This relation tracks how $<_\alpha$ changes in response to updates: $!\phi$ warrants $!\psi$ when updating a context with $!\phi$ generates an ordering that remains unchanged after a subsequent update with $!\psi$ (Portner 2012: §4.1). According to an alternative semantics, a disjunction of declaratives does not denote a disjunctive proposition, but a set of two (perhaps exclusive) propositions (e.g. Simons 2005). In parallel, disjunctions of imperatives can be taken to denote sets of properties rather than a disjunctive property. This requires reformulating the conventions for how clause types update the context: for imperatives, each property in this alternative set is added to TD. To analyze Ross’s example, suppose there are just three worlds consistent with the common ground: in $w_1$ addressee posts the letter; in $w_2$ addressee burns the letter; in $w_3$ addressee neither posts nor burns the letter. Further, let there be no To-Do items. After accepting Post the letter!, $w_2 <_\alpha w_1$ and $w_3 <_\alpha w_1$. Subsequently accepting Post the letter or burn the letter! will change this. Now $w_1$ cannot be ranked over $w_2$. Burning the letter is on the addressee’s TD and the addressee has that property in $w_2$ but not $w_1$. Thus, Post the letter! does not warrant Post the letter or burn the letter! This analysis resembles the one proposed above in that it dynamically tracks an ordering and appeal to an analysis of disjunction that predicts the ordering to change. But the Portner 2012 analysis makes some very different predictions. It incorrectly predicts that a disjunctive imperative warrants each disjunct. After all, the disjunction results in both properties being added to TD.

(49) a. Post the letter or burn the letter!
   b. $\neq$ Post the letter!
   c. $\neq$ Burn the letter!

One may worry that it is just pragmatically infelicitous to utter (49b) or (49c) after (49a). But the problem can be formulated differently. Consider the modal claims the hearer can privately infer on the Portner 2012 analysis: I must post the letter and I must burn the letter. Neither has any plausibility. Portner (2012: §4.1) suggests that the properties introduced by disjunctive imperatives are usually exclusive, as they are here. This is proposed to generate a conflict that requires the addressee to make a choice about which
property will stay on their TD. But the problematic inference highlighted in (49) is also independent of an inconsistent TD. Even for non-exclusive alternatives it is implausible:

(50) Take out the trash or wash the dishes, or do both!

It is clear that I should not infer from (50) that I must take out the trash, or that I must wash the dishes, even though those two claims are clearly consistent. The Portner 2012 analysis not only predicts that I should, it goes further: I must do both. This prediction suggests that the Portner 2012 analysis of or is in fact a more plausible analysis of and. Consider the fact that (13) is oddly predicted to update CG with the proposition that I'll put back Naked Lunch and update TD with the property of you putting back Waverly.

(13) You put back Waverly or I'll put back Naked Lunch

(51) Waverly is boring or it’s at least not interesting

Similarly, (51) results in both propositions, that Waverly is boring and that it’s at least not interesting, being added to CG. While this result is incorrect, it does suggest that the Portner 2012 analysis of disjunction might be useful as an analysis of conjunction that covers mixed cases like (6). Indeed, if one pursued a dynamic property analysis, where clause types and connectives are all assigned compositional meanings in terms of their update potentials, then a sequential update analysis of and would yield exactly these predictions. But a satisfactory account of disjunction would still be needed, and it is not clear whether it is possible. One could try to emulate the above theory by defining contexts as sets of \(\langle CG, QS, TD\rangle\) — whatever that would intuitively mean and however one would modify the definitions of consequence, permission and requirement — and treat disjunction dynamically: the union of the updates with each disjunct. But it is quite clear that it would still fail to address the generalized form of Ross’s Paradox discussed in §2.3. \(! (A \land B)\) would still allow one to infer \(!A\) and \(!B\), and \(!\neg A\) would still allow one to infer \(!\neg (A \land B)\). A combinatorial problem for conditional imperatives will also persist, though this might again be mediated by a dynamic property analysis which could adapt Isaacs & Rawlins’s (2008) dynamic approach to conditional questions. On such an analysis, conditionals introduce a subordinate context where the antecedent has been accepted along with the consequent. Conditional declaratives allow their conditional information to ‘percolate’ to the main context, but conditional interrogatives leave the consequent’s question in the subordinate context. It is not clear how this could capture imperatives with mixed consequents or how it would capture the infelicity of contrary conditional imperatives (§2.2). The contrary imperatives would introduce an inconsistent subordinate TD, but inconsistent subordinate contexts do not lead to infelicity. After all, subordinate contexts are used to model reductio modal reasoning: Suppose this were a bear track. Then that wolf track would have to be a bear track, because they are the same size. Furthermore, don’t kick me, but if you kick me, kick me gently would also lead to an ‘inconsistent’ subordinate TD. While several elements of Portner’s analysis are reflected in the analysis developed above, these insights alone are not enough to explain the data considered here.

4.2 The Modal Analysis

The modal analysis of imperatives is a conspiracy theory, but a clever and gripping one: despite resisting evaluation for truth and differing syntactically from declaratives containing modals, imperatives have a modal propositional semantics. It’s gripping because it assimilates the semantics of imperatives to the familiar, but also because it’s hard to rule out. On the most detailed version of this approach, Leave! denotes the same proposition as You should leave!, though they have different syntactic structures/logical forms (Kaufmann 2012: 60). Should and its imperative analog, call it [!], are analyzed as necessity modals using Kratzer’s (1981, 1991) framework. Modal sentences are assigned propositions relative to a contextually supplied modal base $f$ — providing a domain of worlds — and ordering source $g$ — providing a ranking of the domain. Necessity modals universally quantify over the $g$-best worlds from the $f$-domain. Why can’t imperative utterances be felicitously challenged with sentences like That’s (not) true? Imperative modals are hypothesized to lexicalize a suite of presuppositions which limit their felicitous use to certain contexts. These contexts are ones where should would have only a ‘performative use’ (Kaufmann 2012: Ch.4). Performative uses of modals are supposed to parallel classic performatives (Austin 1979) like I promise that there is an alien in the closet in that it is odd to assess them for truth or falsity despite being declaratives with a propositional semantics. For example, upon reading (52), saying That’s true or That’s false merely evidences that the point of (52) hasn’t been understood. (52) In a book of traffic laws: “Drivers must signal before changing lanes.”

Performatives are best characterized as ones where the salient $f$ and $g$ may not make the modal sentence true, but conversationalists recognize the speaker's authority and can reason that they should shift to an $f$ and $g$ that do make it true. Although the point of such an utterance is to shift $f$ and $g$, this cannot be built into the modal’s semantics directly. Since modals also have non-performative uses that do not aim at this effect, the performative effect must be derived in this indirect manner. By contrast, the sole function of an imperative is to achieve something like this effect. The simplest explanation would be that its linguistic meaning accomplishes the task directly, without a layer of pragmatic reasoning and without the modal proposition that drives it. The modal theory is forced to adopt a more complex explanation: imperatives’ linguistic meaning restricts their use to contexts where this pragmatic reasoning can derive their characteristic effect. Since the modal theory adds to the simplest explanation a set of restrictions and a modal proposition, it must be evaluated along these two dimensions: how simple and satisfactory are these restrictions, and what positive evidence is there for the involvement of a modal proposition in the semantics of imperatives?

Kaufmann 2012 restricts the use of imperatives to performative contexts by endowing them with three presuppositions constraining the $f$, $g$ and context set.50

Authority Condition The speaker is an epistemic authority on $f$ and $g$: for each $w$ in the context set and any world $w'$ compatible with the speaker’s beliefs in $w$: $f(w) = f(w')$ and $g(w) = g(w')$. (Kaufmann 2012: 148-9)

50 For present purposes, a context could be taken to consist of a context set (worlds compatible with what’s presupposed), a modal base and an ordering source.
**Epistemic Uncertainty** Both \( \phi \) and \( \neg \phi \) are compatible with the speaker's beliefs, i.e. for each \( w \) in the context set, there are \( w' \) and \( w'' \) compatible with the speaker's beliefs in \( w \): \( \phi \) is true in \( w' \) and \( \phi \) is false in \( w'' \). (Kaufmann 2012: 157)

**Ordering Source Restriction** If there is a contextually salient decision problem to which \( \phi \) is an answer, then \( g \) is prioritizing (deontic, bouletic or teleological) and considered by speaker and addressee to be the criterion for resolving the decision problem. Otherwise, \( g \) is speaker-bouletic. (Kaufmann 2012: 160)

How simple and plausible is this addition to the semantics of imperatives? This presuppositional content is of unparalleled richness that exceeds imperatives actual content. While the first two presuppositions are reasonable things to expect from an exclusively performative modal, the third is a surprising and disjunctive presupposition. It is at least controversial that the addition of these presuppositions meets the standard of simplicity. But it is also worth considering how satisfactory they are. Do they compromise the theory’s explanatory reach in any way? Consider the examples from §2.2:

(18)  
a. # Unicorns don’t exist. Bring me a unicorn!

b. # The door is open. Open the door!

The Epistemic Uncertainty constraint classifies both utterances as infelicitous. But it does not really explain them. The content of that constraint is simply the generalization that (18) exemplify. While there are certainly cases where one can do no better than stipulate certain generalizations, but that is not the case here. This stipulation is required by the modal theory’s added complexity alone. The simpler hypothesis, that the function and meaning of an imperative is to update an ordering, at least leaves open the possibility of an independent explanation of (18). But it is important to grant that these objections can really only be weighed against the positive evidence for the modal analysis: the evidence that a modal proposition is involved in the meaning of an imperative. The fact that imperatives can be used to resolve questions has been proposed as evidence of this kind (Kaufmann 2012).

Kaufmann 2012: §2.3.3 argues that imperatives must involve a modal proposition because they can resolve questions which the modal proposition would directly answer.

(53)  
a. \( X \): Which bus should I take?

b. \( Y \): Take the number 10 bus.

c. \( Y \): You should take the number 10 bus.

(53b) and (53c) seem to be equally good ways to resolve the question. (53b) achieves this with a modal proposition, but what about (53b)? It is important to distinguish between the act of directly answering a question — asserting one of the semantic answers — and the more general act of resolving a question — doing something which achieves the goals of the speaker which motivated their question. For example, both (54b) and (55b) resolve questions without directly answering them.

(54)  
a. \( X \): How do you open this drink?

b. \( Y \): [Twists the lid of \( X \)'s drink]
Is it possible to analyze (53b) as resolving the question posed by (53a) without directly answering it? On the analysis proposed above, it is. The conversational goal of the imagined question in (53a) is to help the speaker decide which bus to take. An authoritative utterance of (53b) will lead X to prefer worlds in which they take bus 10 over worlds in which they don’t. As discussed in §3.2, any such rational speaker can be expected to thereby choose to take bus 10. Thus, an utterance of (53b) will achieve the conversational goal that motivated the question (53a). It is also worth noting that (53c) is a dynamic consequence of (53b), so the sense in which (53b) resolves (53a) is even tighter than the resolutions in (54) and (55). The possibility of this alternative analysis weakens the case for the modal analysis. Much further argument is needed to show that imperatives resolve questions by directly answering them, and more generally that the propositions assigned to imperatives by the modal analysis are necessary. In the absence of such arguments, a simpler account according to which imperatives directly manipulate modal parameters is preferable. But, it is important to stress just how close these two analyses are. The tools used above to analyze imperatives could be applied to modals as well (see §5.2). A modal analysis could embrace all of those tools and use them to offer explanations of the data in §2.3. So it is only the data from §2.2 and more general theoretical considerations that can separate these two approaches.

4.3 Other Analyses

There are several other dynamic analyses of imperatives, but none of them capture all three observations made in §2. Mastop (2005, 2011) proposes that imperatives denote a new semantic primitive called an action plan, a function mapping atomic instructions to DO and DONT. This element of the analysis makes imperatives float free of contextual information, leaving no clear way to account for the observations from §2.2. In the implementation of Mastop 2011: 331, this element leads to a distinct static connective semantics for imperatives and declaratives which cannot combine the two. In the implementation of Mastop 2005: 105, uniform dynamic connective meanings are used for both clause types, but are still, essentially, ambiguous depending on whether they are embedded under negation. So the data from §2.1 remain unexplained. While Mastop 2005, 2011 offer brief attempts to address Ross’s Paradox others have noted the flaws in these attempts (Vranas 2008, Bittner 2008a). Regardless, it does not explain the generalized form of Ross’s Paradox presented in §2.3. Žarnić’s (2003) dynamic semantics has the same three limitations. Analyses of preference change in dynamic epistemic logics (DEL) of are similar to my analysis in that they connect commands to preference update (van Benthem & Liu 2007, Yamada 2008). However, these logics do not allow imperatives to be combined with connectives. In Segerberg’s (1990) related approach, commands are combinable but distinct connectives have to be used. This approach fails to account for Ross’s Paradox when imperatives scope under disjunction, i.e. they validate the inference from !P to !P ∨ !B. Finally, there is Lascarides & Asher (2003) which elegantly handles mixed sentences. Unfortunately, it does not have a compelling story
to tell about the third observation. It endorses Hare’s (1967) problematic Gricean story about Ross’s Paradox, and leaves the generalized form of the paradox untouched.

The above proposal to have imperatives order propositions is similar to the semantics of Vranas 2008: imperatives denote prescriptions, where prescriptions are pairs of propositions. But that static semantics itself is not satisfactory. It requires different meanings for the connectives that occur between imperatives and declaratives, and fails to adequately address the generalized Ross’s Paradox or explain how imperatives could have modal consequences. Condoravdi & Lauer 2012 also model imperative meaning with preferences and take preferences to relate propositions. However, that approach is developed a close relative of the modal analysis. Imperatives express a proposition about speaker preferences. Condoravdi & Lauer 2012: §6 leave open the possibility of a dynamic analysis where imperatives instead update a preference relation, but do not develop any such analysis. By contrast, the approach presented above derives much of its explanatory power from this feature of the analysis. It is also worth noting that Condoravdi & Lauer 2012 take the preferences expressed by imperatives to be the speaker’s preferences, but the analysis above takes them to be preferences the conversationalists are acting as if they have for the purposes of the conversation.

Charlow 2013 focuses on the kind of data discussed in §2.2 and develops a semantics that explains them. The primary notion there is of a sentence holding relative to a state \(\langle S, \Lambda \rangle\), where \(S\) is a cognitive state that captures an agent’s information (a set of worlds) and \(\Lambda\) captures the agent’s plans. An imperative !\(A\) holds at \(\langle S, \Lambda \rangle\) if \(A\) is necessitated by \(\Lambda\). Using a classical definition of and, this analysis nicely captures the mixed conjunctions from §2.1: \(\langle S, \Lambda \rangle \models \phi \land \psi \iff \langle S, \Lambda \rangle \models \phi\) and \(\langle S, \Lambda \rangle \models \psi\). The fragment presented captures simple conditional imperatives, but does not cover the mixed consequents discussed in §2.1 — though this may be a correctable technicality. However the analysis of disjunction is problematic. For declaratives, disjunction cannot be defined as \(\langle S, \Lambda \rangle \models \phi \lor \psi \iff \langle S, \Lambda \rangle \models \phi\) or \(\langle S, \Lambda \rangle \models \psi\). That would imply that if an agent accepts a disjunction then their information supports one of the disjuncts. But you can accept \textit{Gabe is sleeping or he’s awake} without knowing that he’s sleeping or that he’s awake. So disjunction is instead defined in terms of conjunction and negation: \(\langle S, \Lambda \rangle \models \phi \lor \psi \iff \langle S, \Lambda \rangle \models \neg(\neg\phi \land \neg\psi)\) (Charlow 2013: §5.1). Since imperatives do not embed under negation, and it is unclear what such an embedding would should mean, this semantics does not capture imperatives scoping under disjunction or mixed disjunctions like those discussed in §2.1. As for Ross’s Paradox, Charlow 2013 intentionally sets it aside so it is unclear how the account would be extended to cover the data from §2.3. But it seems that Charlow would also pursue an account that dynamically tracks permission and requirement (Charlow 2011: §4.4.6).

5 The Open End(s)

The semantics and pragmatics for imperatives developed in §3 enjoys advantages over existing accounts, or so I have argued (§4). But two important phenomena not discussed there deserve consideration: the illocutionary heterogeneity of imperatives and the connection between imperatives and deontic modality. I cannot address either in sufficient detail, but hope to show that neither present insurmountable obstacles.
5.1 Illocutionary Heterogeneity

Imperatives typically serve a directive function, but often don’t.

(56)  
a. Try the felafel!  
   *Suggestion*  
b. Win a cruise to Jamaica!  
   *Passive Advertisement*  
c. Have a nice day!/Drop dead!  
   *Wish/Curse*  
d. Be a blonde!/Rain!  
   *Stative/Eventive Wish*  
e. Sit down!  
   *Command*

This heterogeneity has been emphasized in work on imperatives, especially Kaufmann 2012 and Condoravdi & Lauer 2012. While imperatives have a particularly wide range of uses, illocutionary heterogeneity is not unique to imperatives. There is a general question of how the semantics of sentential mood can constrain illocutionary force without determining it. One answer to this more general question is developed in Murray & Starr 2012. There, it is proposed that illocutionary force can be understood in terms of three independently motivated ideas: communication is a joint activity (Lewis 1969, Clark 1996), involves a plan to steer the conversation into a given outcome (Hobbs & Evans 1980, Stone 2004), and conversational outcomes consist in what the agents are mutually committed to act as though they accept and what the speaker and hearer are committed to act as though they *privately* accept (Hamblin 1971). This three-dimensional model of a conversational outcome allows one to capture heterogeneity in an intuitive way. (56a) is an attempt to coordinate on conversational outcomes where: (i) there is a mutual, conversationally adopted, preference for you to try the felafel, (ii) no commitment about the speaker’s preferences and (iii) where the hearer would be better off if they had simply added to their private preferences one for felafel trying worlds. By contrast, an utterance of (56e) typically aims to coordinate on an outcome where: (i) there is a mutual, conversationally adopted, preference for you to try the felafel, (ii) the speaker is publicly committed to having that preference and (iii) the hearer is publicly committed to having that preference. While there are puzzles for this approach, such as analyzing how uses like (56b) can be seen as coordination, I hope to have shown that it at least provides a fertile set of ideas for investigating those puzzles.

5.2 Imperatives and Deontic Modality

There is an intimate connection between imperatives and a range of modal expressions. Indeed, one of my motivating observations about Ross’s Paradox drew on this connection: *You may burn the letter* seems to follow from *Burn the letter!* But the preference semantics presented here seems to be stated in an entirely different framework than the dominant approach to modality developed by Kratzer (1981, 1991). But the two approaches can be easily harmonized. The key elements of Kratzer’s account are a modal base and ordering source. The modal base provides a domain of worlds and the ordering source ranks them. On the present analysis, imperatives also operate over a domain of worlds: $i_R$. The only difference is that imperatives rank alternatives *built up* from those worlds rather than the worlds directly. This courser ranking was essential to the analysis of Ross’s Paradox. However, making priority and deontic modals
sensitive to this kind of ranking would still produce an analysis with the features that make a Kratzerian approach to modality attractive. Thus the two frameworks can be easily unified by having deontic and priority modals draw on the modal base $i_R$ and ordering source $R$ while imperatives modify these parameters. The additional tools developed here—dynamic consequence, ranking alternatives instead of worlds and decision theoretic concepts to select alternatives—may prove useful in the analysis of modality as well. But any attempts in that direction will have to wait for future work.

5.3 The Truly Open End

There are many ends left completely open. I have said nothing about quantification, though I believe the tools in Groenendijk et al. 1996 would allow such an extension. I have said nothing about replacing preferences with utilities and subjective probabilities, even though they are increasingly regarded as the more fundamental objects of investigation in decision theory. In offering a semantics in which sentences express attitudes but embed compositionally, I have stepped into a philosophical debate about which I have said nothing: is an expressivist semantics for moral discourse possible? This debate centers on the Frege-Geach problem (Geach 1965, Schroeder 2008), which appeals to the use of certain declarative sentences in conditional antecedents and under negation to argue against expressivism. Since imperatives do not occur in those constructions and obviously aren't declaratives, it is unclear exactly what my analysis says about this debate. All I hope is that I have said enough of interest about imperatives to merit exploring these questions further.

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