MEDICALLY SPEAKING: CO-VARIATION AS STYLISTIC CLUSTERING WITHIN
PHYSICIAN RECOMMENDATIONS

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A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Linguistics–Doctor of Philosophy

2014

ABSTRACT

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Clinical recommendations are central features of physician-patient interaction. Mandative adjective extraposition (henceforth MAE; Van linden & Davidse 2009, Van linden & Verstraete 2010) is one of many linguistic forms used by physicians in providing recommendations (e.g., *it's important to exercise*, *it's critical that you take these pills*). This study decomposes MAE, a relatively unexplored sociolinguistic variable, into features that contribute both to its pragmatic interpretation as a deontic semi-modal and its social interpretation in the context of physician-patient interaction. These features include MAE's inherent, variable structural components—mandative adjective, complement type, embedded verb type, etc.—as well as MAE's potential suprasegmental hitchhikers (à la Mendoza-Denton 2011), such as intonational contours and creaky voice. The study considers the contributions of these features, in isolation and in concert, to physicians' attempts at balancing their institutional and interpersonal goals when managing consultations. In doing so, it provides a base for understanding how doctors use clusters or layers of linguistic resources (Podesva 2008) to construct their professional personae.

Imperative force is proposed as the central dimension across which MAE forms vary and the object of MAE's social/ stylistic evaluation. In an experiment in which participants evaluated doctors' recommendation style, some structural and suprasegmental features were perceived as 'strong' (i.e. were highly mandative) while others were perceived as 'weak' on a scale of imperative force.

Support for participants' intuitions was provided by a corpus study in which strong and weak MAE feature variants were found to consistently co-occur. 1857 tokens of physicians'

MAE-type recommendations were drawn from the US-wide Verilogue corpus (Kozloff & Barnett 2006) of medical consultations. The integrated perception and production results collectively point to socialization into medical practice as the major social force impacting MAE variation. Medically relevant categories (e.g., specialty), classifications (e.g., disease severity), and experience are all shown to influence MAE variation in physician-patient interaction, where these factors represent concepts and social distinctions that are specific to the context of medicine. Physicians use strong MAE forms as one of many potential sociolinguistic resources in the construction of an authoritative (confident and trustworthy) professional persona, while using weak forms to construct situationally appropriate indirectness.

Overall, this work provides a novel approach to the study of variation in context. It explores stylistically meaningful variability within a single construction, examining patterns of use and perception that define the construction's significance within a professionally constrained subset of transactional discourse. By decomposing MAE into its component variable parts, this dissertation contributes to theories of stylistic compositionality, building on the notion of style clustering whereby "each feature of a style contributes a meaning; the meaning of a style arises out of the intersection of its component features' meanings" (Podesva 2008:4). Moreover, it illustrates the value of cross-disciplinary applications of variationist methodology, quantifying and characterizing patterns of interest to both sociolinguistics and medicine.

To my patients

ACKNOWLEDGEMENTS

I have been incredibly fortunate to have the support of numerous mentors, colleagues, friends, and family members without whom this dissertation would not have been possible. They have stood beside me through the many challenges that have made me into the researcher and, perhaps more importantly, the person I am today. A few brief words are simply not enough to convey my gratitude to these individuals. Nonetheless, I'm going to give it my best try.

First and foremost, I owe thanks to my friends and family. My lifelong friend Val has kept me sane and relatively personable since the seventh grade and continued to do so throughout this process. Her daily calls reminded me that there was more to life than my work; namely, making memories to talk about on our future front porch. Meanwhile, my "work wife" Maddie has kept me on track. Without our laughs in the lab and scheduled fun times, I probably wouldn't have had the wherewithal to see this project through. She and my ever-supportive husband Jon have borne the brunt of every freakout, every moment of doubt, and every absent-minded mistake that comes with writing a dissertation. They have acted as a second family, making sure that I've had whatever I've needed to pursue my goals. In doing so, they have risen to the high standard set by my actual family. As a case in point, my Mom and Dad have continuously given their time and energy to help me succeed. Whether it meant driving me up and down the east coast to visit colleges, sitting through yet another ceremony, or simply listening to me complain about whatever the latest stressor was, they've always been there for me. Everything I know about dedication, strength, and love, I've learned from them.

My mentors and collaborators have been similarly influential in my growth, forming an extended academic family for me. My undergraduate mentors at Georgetown University—Heidi Hamilton, Deborah Schiffrin, Timothy Warren, Pamela Saunders, and Michael Lempert—made me feel at home in academia, patiently guiding me as I found my identity as

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Chapter 1

Language and medicine

> "We tend to remember the extremes... the genius surgeon with an autistic bedside manner, or the kindly GP who is not terribly competent. But the good stuff goes together—good doctoring generally requires both. Good doctoring is a total package [because] most of what doctors do is talk... and the communication piece is not separable from doing quality medicine... Competency is not separable from communication skills. It's not a tradeoff."
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> –Judith Hall (as quoted in Groopman 2007)

Physician-patient interaction is fundamental to the practice of medicine.[1] Despite advances in imaging technology, laboratory studies, and all forms of treatment, simple communication has retained its diagnostic and therapeutic value. Talking with patients is still a primary means of information exchange and is often described as medicine's most common intervention. Furthermore, mounting evidence suggests that "good" communication styles, independent of the content being conveyed, are effective forms of therapy in and of themselves. As Travaline et al. (2005) note, "The manner in which a physician communicates information to a patient is as important as the information being communicated. In fact, research has shown that effective patient-physician communication can improve a patient's health as quantifiably as many drugs... Patients who understand their doctors are more likely to acknowledge health problems, understand their treatment options, modify their behavior accordingly, and follow their medication schedules." Some have suggested (see Bensing &

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[1]Throughout this paper, mentions of 'medicine' and the physician's role primarily reference medical practice within the United States. Though these generalizations may apply elsewhere, such extensions should not be assumed, as the majority of the foundational work on this topic was conducted in the US.

Verheul 2010) that communication style may have an even greater effect on patient wellness than most traditional therapies, accounting for much of the "placebo effect"—whereby a patient's health subjectively improves based on the expectation of receiving medical care, even if there is no biomedically substantiated intervention involved. Unfortunately, there is relatively little consensus on the precise definition of a "good" interactional style: one that can reliably reproduce the health benefits attributed to effective communication.

The lack of agreement on what constitutes a productive communication style is not reflective of inattention on the part of researchers. In fact, even before compelling, outcomes-based evidence for the value of effective physician communication existed, researchers in medicine as well as the social sciences have been eager to characterize the medical visit from a variety of perspectives. For example, discourse analysts have attended to the turn structure of key sequences such as complaint presentation and decision making (e.g., Frankel 2000). They have considered the dialogue-shaping influences of institutional roles (e.g., Ainsworth-Vaughn 1998; Pilnick & Dingwall 2011), disease manifestation (e.g., Hamilton 2004), and cultural expectations (see Candlin & Candlin 2003 for a review). Some have even focused on the structure of certain utterance types (e.g., Stivers & Majid 2007 on questions) or condition-specific topics (e.g., Moore, Candlin, & Plum 2001 on viral load discussion in HIV). This research is almost exclusively descriptive, based on qualitative samples and subjective methods. Though it can provide in-depth insights into the nature of physician-patient talk, it cannot be generalized or reliably replicated. Conversely, work from medical researchers has generally relied on process-oriented metrics—indices of broadly defined codes intended to capture the constitutive tasks of physician-patient interaction—and/ or content-based coding schemes (see Epstein et al. 2005 and Heritage & Maynard 2007 for reviews). These approaches are reproducible and comparable across contexts, but largely inattentive to the linguistic subtleties reported by qualitative researchers (Heritage & Maynard 2007). Ultimately, a thorough characterization of physician communication style requires both quantitative power and linguistically-oriented qualitative rigor. As Heritage and Maynard suggest,

"An analytical framework is required that is responsive to very granular, individual moments in the physician-patient encounter, but that simultaneously supports coding at a higher level of abstraction sufficient to reach beyond individual cases to generate findings at a statistical evidentiary standard" (2007:362).

Variationist sociolinguistic methodology (Labov, Weinreich, & Herzog 1968) offers one potential means by which the tension between granularity and generalizability in the analysis of physician communication style might be resolved. It quantifies patterns in the distribution of linguistic variables, interchangeable options that speakers have for 'saying the same thing' (Labov 1972) with attention to social predictors and influences. Observations generated by focusing on physicians' variable use of individual linguistic features, ranging from phonetic realizations to syntactic and discursive structures, allow for comparison across topics, interaction types, and social settings while also capturing the performance of style at a mechanistic level of detail. Furthermore, there is a robust tradition of assessing contextualized listener evaluations of such variation in a principled way. Through the experimental manipulation of a single feature, listeners' interactional and social judgements of said feature can be isolated, quantified, and meaningfully interpreted (e.g., Campbell-Kibler 2009; Hasty 2012). Thus, by combining studies of physicians' speech production with studies of patients reactions to physician speech, one can work toward a holistic understanding of what truly constitutes a 'good' communication style.[2] 'Good', however defined, may be achieved via many different combinations of linguistic features at variable rates of production. In other words, a variationist approach may be used to quantitatively distinguish every shade of difference between "genius surgeons" and "kindly GPs", providing a feature-by-feature blueprint for the construction of kindliness, competence, and other relevant physician traits as functions of situated sociolinguistic variation.

In addition to contributing a novel perspective on the interactional implications of physi-

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[2]Yet an important contribution of quantitative, linguistically detailed studies is likely to be the observation that there is a spectrum of physician speech styles, as well as of perceived positive physician attributes, including but not limited to 'good'.

cians' communication styles, the study of variation in physician speech promises to yield theoretical insights for sociolinguistics. Medicine exemplifies a profession in which one might expect institutionally conditioned sociolinguistic variation, differential use of linguistic features based on social categories and pressures specific to transactional, purpose-driven talk. Certain linguistic structures, for example, may be used with exceptionally high frequency to accomplish institutional tasks such as history taking, treatment planning, and disease education. Similarly, phonetic realizations, syntactic constructions, etc. may be imbued with locally constructed meanings that further impact their distribution within medical settings (à la Eckert 2008). With respect to physician speech in particular, certain forms may index expertise, empathy, or other situationally relevant stances. This kind of macro-pragmatically constrained language use is rarely studied by variationsts. That being said, there are reasons to suspect that variant frequencies and social patterns observed in non-institutional talk (e.g., in sociolinguistic interviews) are not representative of institutional interactions such as physician consults. In order to truly appreciate the intersection of language variation with societal constructs, variation must be studied in the naturalistic settings where it occurs: in courtrooms, classrooms, backyard barbecues, and—as I will demonstrate with this dissertation—doctors' offices.

The following Sections present the necessary preliminaries for conceptionalizing a variationist analysis of physician speech while further developing the motivations for such an endeavor. Sections 1.1 and 1.2 give a general introduction for the type of variation studied here, while Sections 1.3 and 1.4 elaborate on the expected sociolinguistic implications of this dissertation.

1.1   Variation in physician speech

In principle, any sociolinguistic variable would be suitable for investigation in physician speech. One might reasonably ask, "Do the patterns observed for Variable X in sociolinguistic interviews obtain in physician-patient interactions?" However, the findings of such a

(hypothetical) study motivated solely by context comparison are inherently limited. Demonstrating a difference between speech settings only shows that the settings in question are in fact sociolinguistically distinct; it does not necessarily point to a meaningful distinction, one that pushes beyond the well-characterized effects of situational formality to probe for deeper social significance. In order to identify substantive contrasts that are particular to a given context, the variable under study should be somehow consequential to the interactional work occurring in said setting. For instance, in physician speech, the ideal variable would relate to the practice of medicine. It would not only be present in physician-patient interaction, but it would also impact the structure, interpretation, or outcome of medical consultations.

The variable under discussion in this study came to my attention during a clinical experience. Several years ago, as a first year medical student, I found myself rotating through a high risk breast cancer clinic. This clinic, established by a former breast cancer surgeon, was intended to help women understand their risk of breast cancer both in the immediate and longterm future. Most of the women seeking consultations had a family history of breast cancer. Having watched loved ones struggle with and often succumb to the disease, they came with the intention of minimizing their risk, either through lifestyle interventions, preventative medications, or—in the most ominous cases—elective mastectomy (i.e., breast tissue removal). The physician in charge of the clinic saw between five and ten patients each morning, providing assessments as well as diagnostic and therapeutic guidance. The morning of my observation was particularly busy. We we saw at least ten patients, almost all of whom qualified for a hormonal, preventative therapy to decrease breast cancer risk. This medication, raloxifene, had been shown to markedly decrease cancer rates, but came with a slightly increased risk of thrombotic adverse events (i.e., potentially life-threatening blood clots). Most of the patients had been seen multiple times by the clinic physician and were well aware of raloxifene. During the counseling portion of the visit, the physician always reminded patients that taking raloxifene was an option and, for most patients, endorsed its use. Time and time again I heard, "You should consider starting raloxifene". Seven or so

patients in a row were given this recommendation in the exact same way. As we began to counsel the last patient of the day, I expected to hear more of the same. Instead, the physician urged, "It's really important that you start on raloxifene." As I drove home from the clinic, questions began popping into my mind. Why did the physician use a different structure with the last patient? Did she perceive the structures *You should consider...* and *It's important that you...* to be equivalent? If the same patient had received both formulations, would she have perceived a difference? Furthermore, what about that patient or that specific interaction caused the physician to recommend raloxifene in a different way? One might predict that distinct advice formulations would influence patients' interpretations of a given interaction. Patients receiving the same advice in two contrastive structural realizations might walk away with different understandings of their treatment options, opinions of their physician, or intents with respect to following their physician's advice.

Of the two structures used by my physician mentor, I pursued the less common one: *it's important to/ that X*, or more generally, mandative adjective extraposition (MAE). This structure will be discussed at length in Chapter 2, but for present purposes, it bears noting that MAE is one of many structures produced by physicians when presenting professional advice. More specifically, physicians use MAE to present treatments (1a), recommend lifestyle alterations (1b), and provide guidance/ instructions (1c), functions that can also be performed by modal verbs/ auxiliaries (2).

(1) a. It's important to stay on that because that'll help bring up your HDL and bring down those triglycerides. (Verilogue 29745)

  b. It is very important to eat more frequently- (Verilogue 67060)

  c. It is important to have the diabetes controlled, as you know, because it can affect your eyes, you can, your kidneys, your, you can hardening of the arteries in the heart? (Verilogue 64924)

(2) a. Uh, but you should start taking a baby aspirin. (Verilogue 63247)

b. ...you need to exercise and you need to watch your food. (Verilogue 30668)

c. ...you should be using your Albuterol inhaler 2 or 3 times a day throughout the week, not waiting till it gets worse again. (Verilogue 28638)

Any mandative adjective—*crucial, critical, vital, essential, important*, etc.—and/ or complement type (e.g., *it's important to...* v. *it's important that...*) can perform these advice-giving functions[3], which can be collectivized under the speech act of 'recommending'.

Recommendations are directive-like illocutionary acts that impose some degree of obligation or necessity on their intended agent. They propose a possible future and endorse it from the perspective of the speaker. In this sense, recommendations potentially encompass the spectrum of acts ranging from stance-taking (e.g., *I prefer the window open.*) to straightforward directive provision (e.g., *Open the window!*), assuming that the macro-pragmatic circumstances of a given interaction support these interpretations. Crucially, as I will explain in Section 1.2, recommendations are context dependent. In a setting such as physician-patient interaction, the physician's expression of a professional opinion would qualify as a recommendation, where a similar act performed in a symmetric, non-transactional context would not convey any illocutionary force whatsoever. For this reason I distinguish physicians' advice-giving acts from directives, opinions, and other previously studied speech acts by referring to them collectively as 'recommendations'.

Recommendations are inexorable elements of physician-patient interaction, products of the consultative nature of medical visits. Gwyn and Elwyn frame this claim in terms of professional responsibility: "It is inevitable [...] if the doctor is doing his job properly, that the professional opinion is made available, even if this undermines the opportunity to arrive at a 'shared' but essentially 'incorrect' decision." (1999:446). In this sense, physicians are compelled to give advice in the same way they might be obliged to conduct a thorough physical exam or perform a potentially beneficial procedure. Recommendations constitute part of the doing of medicine as the performative aspects of physician-patient talk. They

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[3]I focus on *important* for reasons explained in Chapter 2.

create agreements between the physicians and patients that may not be fulfilled, but that are socially significant regardless of their behavioral realization. As such, interactionally meaningful, institutionally constrained sociolinguistic variation would be anticipated between and within recommendation forms.

1.2   The act of recommending

There is substantial evidence to support the notion that recommendations are distinctively central to the physician-patient visit. As a starting point, recommendations appear to represent a larger proportion of physician-patient interactions than non-transactional conversations. In an analysis of the Switchboard corpus (Godfrey & Holliman 1993, inter alia), Jurafsky and colleagues (1997) applied speech act labels to every utterance produced over the course of 1155 brief telephone conversations averaging 271 utterances per call. They reported that directives comprised less than 0.4 percent of the total number of speech acts in their corpus. When compared to other acts, this percentage suggests that directives are relatively uncommon in everyday speech (as represented by the Switchboard corpus).[4] In contrast, studies of physician-patient dialogue indicate that recommending practice, including lifestyle advice as well as treatment planning, accounts for nearly 10 percent of the average family practice visit (Stange et al. 1998). These numbers cannot be directly compared, seeing that Stark et al. were measuring topic-based time at talk while Jurafsky et al. were counting individual speech acts. Nonetheless, even in the case that Stange et al.'s method grossly over-estimates the proportion of recommending talk in medical visits, the twenty-fold difference between the amount of recommending in conversational versus transactional, medically oriented speech is still striking.

Part of the difficulty in quantitatively comparing recommendation frequencies across contexts has to do with the particular way recommendations are interpreted in physician-patient

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[4]Though Jurafsky et al. do not report on the forms of these directives, it is reasonable to assume that MAE comprised a vanishingly small proportion of the total directive count.

interaction. A medical recommendation, for the purpose of this work, is a potentially directive utterance that presents a stance on a treatment, lifestyle change, or another course of action to be implemented by the patient. The notion that patients are implicitly obliged to follow medical recommendations, even in their most indirect or heavily hedged forms, distinguishes them from non-recommendation stances in non-transactional conversation. Forms that are not inherently deontic take on some degree of illocutionary force when uttered by a healthcare provider in the context of a consultation, compelling or obliging the patient to comply. Consider (3) as an example, where the patient expresses an expectation that the physician will recommend a treatment to her:

(3) **Patient**   What do you think I should be taking?

Doctor   I think that probably you can try to go higher on your, on your Paxil because you still feel depressed and anxious [...]

Patient   All right.

(Verilogue 26559)

In (3), the recommendation *you can try to go higher* has a deontic interpretation (i.e., one of necessity or permission) that is strengthened based on its position in the discourse (following a request for advice) and the larger situational context (a treatment discussion). Even in the absence of these strengthening discourse features, however, *you can try to go higher* still has a deontic flavor insomuch as it is being uttered by a physician. He is the individual with the institutionally defined authority to prescribe a higher dose of Paxil in this interaction, so his stance on dose adjustment is implicitly obligatory or, at very least, permissive.

Generalizing from the example in (3), several macro-pragmatic, institutionally based assumptions additionally underline the centrality of recommendations within medical consultations. Given that institutional discourse is inherently asymmetric, with physicians holding a disproportionate amount of interactional power, physicians can felicitously impose their views on the patient (see Austin 1975:26, a.o. on felicity conditions for speech acts). This

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can occur in the form of a directive, a performative act that represents "[an attempt] by the speaker to get the hearer to do something" (Searle 1976:11), or a deontic/ bouletic expression that merely expresses a desired state of affairs. As indicated above, in the case of physician-patient talk, the distinction between these two concepts is minimal, as the physician's position as an authority figure allows for a directive interpretation of deontic/ bouletic expressions. Again, the term "recommendation" is intended to reflect this context-specific ambiguity, where desire statements might be interpreted as directives.

Though physicians are situationally licensed to provide forceful recommendations, these relatively invariant social circumstances do not imply a lack of variation in physicians' recommendations. In contrast to Roberts' assertion that "the [physician's] recommendation itself is often a fairly straightforward matter" (1996:105), Ervin-Tripp (1976) notes that physician directives vary considerably in their illocutionary force, ranging from inexplicit 'hints' to relatively frank 'need statements'. Labov and Fanshel (1977) described a similar continuum in psychotherapy discourse, where directives could be mitigated (i.e., indirect) or direct. (3) illustrates this concept, as *I think that probably you can try to go higher on your, on your Paxil* contains multiple mitigators. Epistemic hedges such as *I think* and *probably* along with the dynamic modal *can* counterbalance the physician's situational authority. Rather than simply stating "I am going to increase your Paxil", the physician in (3) frames his recommendation as a polite suggestion, interactionally positioning the patient as the ultimate decision-maker. Though this mitigating effect was accomplished using semantic and syntactic resources in (3), obligatory force modulation can be implemented at any level of the linguistic system. Just as the recommendation in (3) was strengthened by its discourse position, it could be weakened by turn structure, intonational patterns, paralinguistic emphasis (e.g., gesture), etc. In this way, individual realizations of physician recommendations contribute differentially to an expert or professional style, indexing physician authority over the patient in a gradient fashion.

Physicians' interactional manipulation of recommendation forms, along with other indices

of authority, has implications for the physician-patient relationship. Professional authority is essential to physician-patient interaction insomuch as it allows physicians to effectively and efficiently complete institutional tasks such as prescribing medications, gathering information, and providing health education (ten Have 1991; Ainsworth Vaughn 1998; a.o.). As Pilnick and Dingwall assert, "...asymmetry lies at the heart of the medical enterprise; it is, in short, founded in what doctors are there for" (2011:1374). That being said, excessive displays of professional authority can be perceived as inappropriate or inconsiderate. In the following exchange, the patient protests the physician's inattention to his concerns:

(4) **Doctor**   We already repeated the blood cultures for you while you were in the hospital and it cleared back on the [DATE], but that doesn't mean it's completely gone. You need to be maintained on this medication for a while.

Patient   It don't stay in my stomach.

Doctor   Okay. Relax. All righty. So how do you, are you taking this medication?

Patient   Okay, now, can I talk now?

Doctor   Sure.

Patient   I eat something, like it says on the bottle, it tells you to eat something first.

Doctor   Okay.

Patient   I force something to eat, because I can't even eat.

(Verilogue 95773)

Here, the physician gives a relatively direct recommendation: *you need to be maintained on this medication for a while.* The patient becomes agitated, objecting to both the content of the recommendation and the patronizing tone taken by the physician. His question—*Can I talk now?* —further highlights his negative evaluation of the physician's interactional positioning. The patient's reaction can be understood in terms of Goffman's (1955) concept of facework, where unmitigated authoritative acts represent negative face-threats that challenge the patient's concept of self. Robins and Wolf characterize recommendations as inherently

face-threatening such that "...when physicians prescribe treatment regimens, they may limit patients' lifestyle choices and so, by definition, violate face" (1988:217). In order to realize their institutional goals while preserving a positive physician-patient relationship, physicians must modulate their use of forceful recommendations and other authoritative indices. Physicians may choose to use mitigated deontic forms (Labov & Fanshel 1977) as a strategy for preserving patients' positive self-identity, thus attempting to manage competing pressures: the need to present a pragmatically interpretable request and the interpersonal drive towards indirectness.

To summarize, in addition to being comparatively frequent in medical consultations, recommendations are key touchpoints in physician-patient dialogue where physicians engage in a delicate sociolinguistic balancing act. Based on the interactional tension represented in the speech act of recommending, individual recommendation forms (such as MAE) seem to be a particularly well-suited candidates for the observation of socially conditioned variation in the speech of medical professionals. Intuitively, one might assume that physicians' use of recommendation structures and modulators would vary with different interactional conditions. More specifically, one might predict variation conditioned by patient characteristics or biomedically salient contexts e.g., different disease states (diabetes, depression) or visit types (established condition, undiagnosed problem). This follows from the idea that recommending is one of many ways medicine is practiced. Just as a physician might vary his or her physical exam based on a patient's presentation, s/he might also change the forms of his or her recommendations to fit the situation. Further, it is possible that physicians' use of recommendation forms may change over the course of their professional lifespans. Just as physicians learn to listen for heart murmurs, refining their technique and acquiring advanced maneuvers over time, they might mature in their use of recommendations over the course of their careers. Any of these possibilities are plausible, given that no previous research has observed the social patterning of physicians' recommendation use on a quantitative scale. The current work, focusing on mandative adjective extraposition, is somewhat exploratory

from this perspective, working on the assumption that a variety of recommendation forms may share social constraints within the context of physician-patient interaction.

1.3   Professional communities

In generalizing across the institution of medicine and outlining potential constraints on physicians' recommendation use, the preceding discussion tacitly assumes that physicians form a sociolinguistically analyzable unit. That is to say, it takes physicians' social cohesion for granted to the point of implying that physicians of different genders, ethnicities, social class backgrounds, and geographic locations will, to some extent, sound alike in their provision of medical recommendations. This is not a negligible claim. Before continuing to develop the idea of institutionally constrained variation in recommendation production, the social structure of the physician professional community requires further elaboration.

In order to characterize how physicians might function as a sociolinguistic unit, it is helpful to consider how other groups who share specialized knowledge, pursuits, and ideologies have been studied. Recent work in the variationist paradigm has focused on the sociolinguistic dynamics of non-traditional communities including Latina gang members (Mendoza-Denton 2007), self-identified geeks (Bucholtz 2001), popular middle-schoolers (Eckert 2010) and sorority girls (McLemore 1991). These studies have contributed to our understanding of the complex relationship between social structure and linguistic behavior. Though they draw on Labov's (1989) concept of the speech community, wherein speakers share evaluations of linguistic behavior, these inquiries abstract from regionally defined communities to highlight the linguistic effects of 'mutual engagement' in social practice through shared beliefs, goals, and activities (Eckert & McConnell-Ginet 1992). The groups defined by said commonalities represent Communities of Practice (CoP). Research within the CoP framework has demonstrated sociolinguistic distinctions based on religion/ ethnicity (e.g., Benor 2001; Levon 2006), gender (e.g., Podesva 2006), hobbies (e.g., Hoecker 2011; Seilhamer 2011) and institutions such as politics (e.g., Harris 2001) and business (e.g., Holmes & Marra 2002,

Schnurr 2009). Notably, Zhang (2005) found that employment in state-run versus privately owned Chinese businesses influenced the use of Mandarin dialect features in Bejing. In particular, full tone, which indexes the cosmopolitan identity of Taiwanese/ Hong Kong culture, is associated with employees of private businesses, Zhang's "yuppies". These yuppies use linguistic resources to construct a globally oriented persona, layering them along with other indices of cosmopolitan Chinese culture (e.g., dress, technology, media). This and other occupationally framed studies point to profession as a socially salient framework for linguistic variation, alluding to the importance of institutionally defined CoPs in sociolinguistic behavior.

As I have already suggested, there are several ways in which the practice of medicine imposes role-specific behavior and ideology. These unifying forces are especially well-articulated for the physician role. Physicians are identified as symbols of the greater practice of medicine, acknowledged with their own semiotics among other medical practitioners and laypeople alike. Some physician markers are obvious: they wear white coats, they have special address forms (i.e., "Doctor"), etc. Others are more subtle. For example, physicians ritualistically select and induct members into their ranks. They undergo years of specialized training and maintain a complex, hierarchical structure with various written and unwritten rules. Furthermore, they share grossly similar goals and challenges when interviewing, treating, and generally interacting with patients. All of these factors point to physicians as a Community of Practice, a social unit with distinct pressures to act and sound a certain way, especially in the context of professional interactions.

That being said, describing physicians as a Community of Practice entails a departure from the canonical formulation of the CoP framework. Participants in a CoP typically have direct social contact. For example, cohorts of middle schoolers might congregate on a playground or groups of religious observers might encounter each other at worship services. Physicians in the general sense, without a location-based restriction, are comparatively isolated. This does not mean, however, that they are not *mutually engaged* in the practice

of medicine. The criteria for CoP status (Wenger 1998; cf. Meyerhoff 2002)—*mutual engagement*, participation in a *jointly negotiated exercise*, and *shared linguistic repertoire*—are satisfied by the physician profession in the following ways:

(5) a. Physicians, particularly within a given specialty, are *mutually engaged* in a set of institutionally defined tasks related to patient assessment, education, and treatment (i.e., diagnosis, acute management, and long-term care planning).

   b. Physicians are involved in the *jointly negotiated exercise* of clinical medicine, wherein they contribute to and derive authority from community-held standards of practice.

   c. Physicians have a *shared repertoire* of pragmatic devices that map to particular linguistic forms (e.g., semantic extensions, syntactic constructions) in addition to a specialized lexicon. They use these resources to efficiently and effectively realize their institutional goals.

In the case that the descriptions in (5) represent legitimate means of satisfying the CoP requirements, physicians would be expected to share social constraints on their language use. More specifically, with respect to the current work on mandative adjective extraposition, one would predict physicians' use of MAE forms to be influenced by the factors suggested in Section 1.2: biomedically relevant categories and characteristics, despite their lack of in-person social contact. This would demonstrate that *mutual engagement* in patient care is sufficient to shape physician speech.

   For the time being, the observations in (5) will serve as evidence in favor of treating physicians as a CoP. Later Chapters, in detailing the constraints on physicians' MAE use, will provide a basis for reassessing these claims and confirming that the CoP framework—as opposed to register (Agha 2005) or Community of Imagination (Wenger 1998)—best accounts for physicians' sociolinguistic behavior. By rigorously considering the issue of community participation, this dissertation may further refine our definition of *mutual engagement* and

challenge extant claims regarding the necessity of direct social contact for establishing sociolinguistic similarity.

1.4 Co-variation and professional style

Another proposal from Section 1.2 that deserves additional attention is the idea that variation occurs both *between* and *within* physicians' recommendation forms. Thus far I have largely focused on the former, enumerating the many ways in which a recommendation might be expressed. The majority of this work, however, will deal with variation *within* a form, dissecting mandative adjective extraposition into its component features. There are theoretical and methodological motivations behind this choice that will be elaborated upon in Chapter 2, but for now, the implications and potential gains from an intra-recommendation perspective can be considered.

Throughout this study, I will be characterizing the features that compose mandative adjective extraposition (MAE). With the term 'features' I intend to include MAE's essential structural components, the semantic and syntactic elements that create a grammatical MAE form, and the suprasegmental, phonetic attributes that are extrinsic to the MAE construction but nonetheless contributory to its stylistic realization. Each of these features is a variable in and of itself. For example, MAE's mandative adjective position is a structural slot that can be filled by any semantically qualified form: *important, critical, vital*, etc. Similarly, MAE's complement structure can be satisfied by either an infinitival clause (e.g., *it's important to...*) or a finite full clause (e.g., *it's important that...*). By studying the extent to which feature-level variables such as adjective selection and complement choice are dependent on one another, I will be able to assess the extent to which MAE forms are sums of their respective parts. Furthermore, by determining how these parts are valued in physician-patient interaction, I will provide an integrative analysis of physician style within MAE, thus building towards the goal of sociolinguistically defining physician communication style through precise yet sensitive means.

Two relatively under-investigated issues are represented in my treatment of MAE and its role as a stylistic resource: 1) I have conceptualized MAE as a kind of umbrella variable encapsulating a set of variable processes, and 2) I have asserted that variable processes within the same syntactic construction both independently and collectively index interactional identities (cf. Eckert 2005, 2008). Sociolinguistic studies typically report on the distribution of one or more linguistic variables in a given speech community or group of individuals, but rarely integrate these patterns in terms of locally constructed social praxis. Labov's (1966) study of New York City, for example, describes the style, social class, age, gender and ethnic distribution of a range of mostly phonological variables in order to understand the high-level, demographic determinants of variation. On a smaller social scale, Cheshire (1982) reports on the distribution of numerous morphosyntactic variables in the speech of two groups of British adolescents, analyzing them as distinct sources of evidence in the characterization of group dynamics. These studies represent the standard procedure of variationist work: to treat variables one by one in order to describe who uses them, how frequently, and under what circumstances. There are, however, some recent exceptions to this discretizing approach. Labov (2001) examines the overall degree of correlation between use of advanced variants of several phonological changes for the purpose of determining whether speakers who are leaders of one sound change are also leaders of other ongoing sound changes. Tagliamonte and D'Arcy (2009) utilize an analogous method in an attempt to generalize age-based trends across several variable types. Even in these cases though, the correlation of multiple sociolinguistic variables is regarded as a means by which to demonstrate social effects.

Only a handful of quantitative studies have explored the role co-variation plays in performative style, asking the questions: What social work do co-occurring variables perform? What is the speaker trying to achieve? When a speaker uses several socially-meaningful linguistic features in concert, what is he or she trying to convey about him or herself? Bucholtz (1999) considers some of these issues in her study of adolescent in-group speech. She shows that a range of lexical, phonetic, morpho-phonological and discourse-pragmatic features are

employed (sometimes all at once in a single utterance) by adolescents in a California high school to project a "nerd" identity. Likewise, Podesva (2008) observes the co-occurrence of three variable types: prosodic (intonation contours), phonetic (falsetto), and phonological ([t]/[d] deletion), finding that indexically related variants of these features are employed at meaningful points in a speaker's narrative to construct, for instance, a "gay diva" persona. He observes that "each feature of a style contributes a meaning; the meaning of a style arises out of the intersection of its component features' meanings" (Podesva 2008:4). Though a compositional understanding of style is often alluded to in work on performativity and soci-olinguistic identity construction, Podesva's operationalization of style clusters represents one of few attempts to formalize this intuition into a testable, quantitatively oriented framework.

In this dissertation, I will focus on one of many questions that arise under such treatments of style: What is the speaker trying to achieve stylistically through deployment of multiple sociolinguistic features? In other words, how does layering these features help them to achieve their conversational ends? Although I will build on prior work on stylistically motivated linguistic collocation, my selection of a speech act as the 'umbrella' variable for a variety of superimposed sociolinguistic processes makes a novel contribution to the literature. In particular, I will show how the speech act of recommending can be produced and modulated by speakers and perceived by listeners, via the simultaneous layering of syntactic-pragmatic, phonetic, and suprasegmental features.

This dissertation therefore contributes to a theory of stylistic compositionality while expanding upon the study of non-phonological variation. More specifically, it thoroughly circumscribes and characterizes a syntactic-pragmatic variable (i.e., mandative adjective extraposition) within the greater set of performatives, analyzing it along with several of its component semantic, prosodic, and phonetic features. This analysis serves as a first step towards treating the speech act of 'recommending' as a formally quantifiable function-based sociolinguistic variable, grounding the variationist treatment of such pragmatic units in terms of their consistency with other, previously studied levels of the grammar. Approach-

ing recommendations from a cross-sectional perspective—one that integrates multiple layers of variation within a socially interpretable unit—fundamentally relates to the study of style whereby variation within a recommendation may impact its ultimate pragmatic interpretation, modulating the speech act's illocutionary force and constructing its social meaning. As Podesva (2008) suggests, stylistic clusters may be inherently related to speech acts in the sense that they are performative: they create a discrete, socially interpretable act of identity or influence. By decomposing a performative into its component variable parts, the current work will further disentangle the linguistic and social constraints on stylistic compositionality.

Chapter 2

Mandative adjective extraposition

Up until this point, mandative adjective extraposition (i.e., MAE), my variable of interest (italicized in 6), has been discussed in rather general terms. To facilitate a rigorous analysis of MAE's social and linguistic distribution in physician speech, however, a more thorough understanding of MAE and its component features is needed.

(6)   a. *It's important that you stay on the medicine.* You understand that? (Verilogue 101883)

      b. So *it's crucial to keep hydration at a good level.* (Verilogue 3657)

      c. That plaque is made up of cholesterol, so *it's essential that we keep your cholesterol under good control...* (Verilogue 76731)

The subsequent Sections further develop MAE's role in the modal system (Section 2.1), its variable context (Section 2.2), and its constitutive features (Sections 2.3 and 2.4).[1] The definitions and concepts established in these Sections will form the basis for my MAE perception study (Chapter 3) and production studies (Chapters 4 and 5). Section 2.5 provides an outline of the entire MAE investigation that will be pursued in Chapters 3, 4, and 5.

2.1   MAE as a deontic modal form

MAE is part of the deontic modal system, the collection of structures, lexical items, and particles that convey necessity, obligation, probability, and/ or possibility (Hoye 2005). The use of a modal expression represents a speaker's construction of reality as it could or should be, expressing his or her stance on a potential future. Modal expressions have many forms,

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[1]See Section 2.3 in particular for a thorough discussion of MAE's composition and syntactic definition.

including the modal auxiliaries (e.g., *could, will, should*), modal adverbs (e.g., *probably, certainly*), modal verbs (e.g., *need to, have to*), mental state/ mandative predicates (e.g., *it is probable that*, cf. Nuyts 2001; *it is important that*, cf. Van linden & Davidse 2009, & Verstraete 2010), and other so-called modal particles (e.g., *may well*, cf. Hoye 1997). Examples of these various modal forms as observed in physician-patient interaction are given in (7).

(7)   a.   Now, you should take it at different times a day, but the most important time is actually early in the morning. (Verilogue 48795)

   b.   It's critical that you get a level check one week after the injection. (Verilogue 74405)

   c.   Take this twice a day. (Verilogue 26842)

   d.   So, I'm prescribing something different. (Verilogue 75470)

Each form in (7) expresses deontic modality in a related but distinct way, with different structural elements providing obligatory or permissive connotations. The modal character of (7a) appears to derive from its modal auxiliary *should*, while (7c) receives an obligatory interpretation due to its imperative syntax. Furthermore, these individual forms represent varying levels of context dependency. (7a-7c) might receive a deontic interpretation in any pragmatic environment, but (7d) might not have obligatory implications for the listener outside of a medical setting. The diversity of modal forms and variability of modal implicature exemplified in (7) has presented a challenge to theoretical linguists and sociolinguists alike. Despite the volumes of research on modality, several questions regarding the modal system remain unanswered, especially with respect to modal pragmatics.

One key question for the purposes of this study pertains to the gradient interpretation of obligatory force: how do modal forms convey different degrees of obligatory force? In other words, to what extent are deontic structures or individual forms within a structure functionally comparable? A partial answer to this question can be gleaned from work on modal scalarity. Deontic forms have been described as referencing a scale of necessity rang-

ing from permission to obligation (Horn 1972; Hirschberg 1985; Lassiter 2011; a.o.). Each deontic form's lexical denotation locates it with respect to meaningful values on this scale, while also relating it to an implicit set of contextual alternatives. Lassiter (2011) describes three classes of scalar deontic forms: high, mid, and weak. Each of these classes has its own probabilistic threshold value for expected truth that must be satisfied in order for its member forms to be acceptable in association with a given proposition. High deontic forms associate with propositions whose expected truth exceeds a high probability threshold, one that excludes the possibility of other alternatives (Lassiter 2011:193). Mid deontic forms also have a high expected probability, but only relative to other possibilities in a set of alternatives that reference the same probability threshold (Lassiter 2011:182). Weak deontic forms, those expressing permission, fail to meet the probability thresholds of the mid and high classes while exceeding the threshold for indifference (Lassiter 2011:196). Within each of these semantic categories, there is substantial latitude for pragmatic modification. A contextualized form can be described as more or less compelling (i.e., obligatory, forceful, or strong) relative to other classes and other forms of the same class.

Framed interactionally, scalar interpretations of obligation and permission differentially commit the modal agent (i.e., the person who is affected by the modal state) to an action or perspective (Verstraete 2005), expressing degrees of illocutionary force (Austin 1975). Individual uses of deontic forms share the capacity to carry illocutionary force as a function of their relatively uniform semantics, but receive a variable, context-dependent interpretation through the intrusion of conversational and situational pragmatics. In other words, obligatory modals collectively convey commitment to the speaker's agenda, but do so to different extents based on the linguistic and social circumstances of their utterance.

For variationist purposes, deontic modals, deontic modal verbs, and deontic semi-modals may be conceptualized as form-based (i.e., structurally related) variable subsets of linguistic items with the potential to convey illocutionary force (see Tagliamonte & Smith 2006; Tagliamonte & D'Arcy 2007 on deontic modal verbs). More broadly construed however,

different forms that convey comparable degrees of obligation (i.e., obligatory force) may also vary based on linguistic and social factors. As such, perceptually salient classes of deontic forms represent well-circumscribed sociolinguistic variables, offering several options for 'saying the same thing' (Labov 1972). Obligatory force or, more generally, illocutionary force, constitutes a pragmatic variable within the semantic classes of forms that perform a deontic function.

2.2 MAE as a functionally constrained variable

Treating obligatory force as a unifying dimension across which all deontic forms vary requires a substantial expansion of the traditional concept of a sociolinguistic variable. Though the study of variation "above and beyond phonology" (Sankoff 1986) is now relatively common practice, researchers are still responsible for accountably defining the envelope of variation[2] for syntactic, semantic, and discourse-pragmatic variables. The case for inclusion in a given variable context is typically made with respect to functional equivalence. Especially in the case of discourse-pragmatic variables with multiple contrastive surface forms, researchers point to 'weak complementarity' (Sankoff & Thibault 1981; cf. Tagliamonte 2006) between forms, arguing that forms are 'doing the same thing' even if they are not technically 'saying the same thing'. This construal of sociolinguistic variation is still somewhat problematic for the present purposes, however, as saliently contrastive levels of obligatory force are arguably 'doing' different things; they are, by definition, obligating the listener to different extents. Pushing the bounds of weak complementarity a bit further, Terkourafi (2011) as well as Schneider and Barron (2008) propose approaches to functional equivalence in the variationist paradigm that would accommodate an analysis of recommendations with variable obligatory force. In particular, Schneider and Barron's 'actional' level of variational

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[2]A variable's envelope of variation or variable context is "the largest environment in which this variation occurs" (Labov 2008:2). A defensible variable context is necessary "in order to apply the principle of accountability: that reports of the occurrences of a variant must be accompanied by reports of all non-occurrences" (Labov 2008:2-3).

pragmatics, where the "starting point for the analysis is the illocutionary act, i.e. the communicative function of an utterance reflecting the speaker's intention" (2008:20), develops a theoretical frame for this type of analysis. Nevertheless, this does not solve the practical issue of identifying forms within the illocutionary act of recommending. We are left with the challenge of accountably delimiting a variable context for obligatory force in terms of perceptually salient deontic classes, where the difference between theoretic intuition and empirically demonstrated salience is largely unexplored.

As detailed in the previous Section, several researchers have proposed well-motivated typologies for modal types and sub-types within the grammar (Hoye 1997; Huddleston & Pullum 2002:175-177; Lassiter 2011), but these systems exclude aspects of linguistic and social context that are essential to interpreting a deontic form as an utterance in natural speech. For example, (8) may be interpreted as having a different degree of obligatory force based on speaker characteristics:

(8)   You should really take 2 pills. (Verilogue 9082)

When uttered by a peer, (8) may be perceived as moderately forceful. It presents its proposition (i.e., taking two pills) as desirable, but not necessarily obligatory. If (8) is uttered by a parent, physician, or other authority figure however, it may be interpreted as incrementally more forceful than in the former scenario. Ervin-Tripp (1976) observed this situational variability within and across institutional contexts, providing evidence for the intuition that a given deontic form's obligatory force is dependent on the circumstances of its utterance. Modal typing systems are unhelpful in understanding and ultimately characterizing this difference. Furthermore, the extent to which the intensifier *really* and the mental verb *think* modulate the obligatory force conveyed by *should* is not captured by modal typologies. One might ask, do *should really* and *must* form a usage-based class that is not captured by lexical semantics? Though one would not expect semantic models to capture performance, let alone perception, the lack of a well-demarcated, empirically based classification for deontic forms complicates the process of circumscribing a variable context for obligatory force. It makes it

difficult to consider an entire semantically defined deontic class (as suggested above) without first considering the variability that might exist within a single modal form.

Given the practical and theoretical obstacles to studying the act of recommending as an all-encompassing variable, one that includes all of the many deontic forms listed in Section 2.1, this study exclusively considers variation within mandative adjective extraposition (MAE). This is not to suggest that a more comprehensive analysis of recommendations would be undesirable. To the contrary, the current focus on MAE might be seen as a first step towards such an analysis. Individual, rigorous analyses of deontic modal semi-modal forms for which usage-based models have been derived are necessary preliminaries in that they test whether or not said forms are perceived as recommendations and subject to sociolinguistic variation in the context of interest.

2.3 MAE's inherent structural features

The literature on mandative adjective extraposition (MAE) is, unfortunately, rather limited. Only a handful of published works specifically study MAE and none of these explicitly adopt a variationist approach. That being said, Van linden and Davidse (2009) lay a foundation for specifically studying MAE as a circumscribed syntactic construction with variable obligatory force. They define its variants based on rigorous, structural parameters and ascribe differential interpretations to these forms. In order to appreciate their framework, however, MAE's form and interpretation must be precisely defined.

As noted above, MAE is a specific construction within the deontic modal/ semi-modal system. It is defined by its extraposed syntactic structure as well as the semantic character of the elements occupying said structure.

(9) a. Um, but if it is running high in both the arms then we probably should add the blood pressure medicine. Uh, *it's really important that we control the blood pressure* (Verilogue 39594)

b. Yeah, you should be on medicine, uh, *it's very important to have your blood pressure under control.* (Verilogue 17522)

MAE (shown again in 9) consists of an expletive/ anticipatory *it* (Kaltenblöck 2003), an adjective of importance (*important, crucial, critical, essential,* etc.) or appropriateness (e.g., *good, desirable, suitable,* etc.; Van linden & Davidse 2009), and a complement clause. As a group, adjectives of importance are more clearly associated with deontic and directive meaning (Van linden & Verstraete 2010). Moreover, to have any mandative potential whatsoever, a given MAE's complement clause must express a potential state of affairs as opposed to a realized state of affairs (Van linden & Verstraete 2010). That is to say, the action conveyed by its complement cannot have already occurred.

MAE has been described as a syntactic variable due to its potential for complement variation. MAE complements alternate between a tensed verb form with a finite complement (9a) and an infinitival complement form (9b). Van linden (& Davidse 2009, & Verstraete 2010) suggests that this syntactic variation has pragmatic implications, where the infinitival form (9b) is more likely to have some degree of obligatory force as a deontic modal. Given this association, I will refer to MAE as a syntactic-pragmatic variable.

The syntactic-pragmatic label is somewhat misleading, however, as almost every aspect of MAE's structure has the potential to vary. (9a) is diagramed in Figure 2.1 to facilitate discussion of these features.[3] Starting in the top left corner of Figure 2.1, MAE's expletive/ anticipatory *it* can be realized in either a contracted or non-contracted form with the present tense copula. Future tense forms featuring *will be* or *is going to be* do not allow for contraction. Moving to the right in Figure 2.1, MAE's adjective of importance or appropriateness can be represented by one of many semantically related forms. Van linden and Verstraete (2010) recognize the following possibilities: *appropriate, convenient, desirable, expedient, fit, fitting, good, important, profitable, proper, suitable, critical, crucial, essential, indispensable,*

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[3]In the absence of an explicit source, relative frequencies and characterizations given in this Section are drawn from the production data presented in Chapter 4.
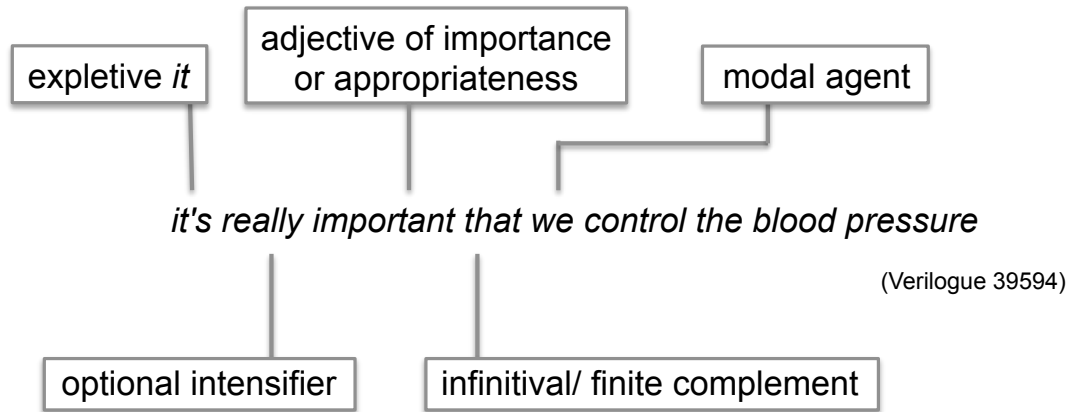
Figure 2.1 Inherent structural features of MAE mapped on an illustrative example.

necessary, needful, and *vital.* The next feature, MAE's modal agent, is only necessary for grammaticality in finite-complement MAEs. Infinitival forms may specify a modal agent via a preposition (e.g., *it's important for you...*) or leave it out entirely. Common agents include listener-oriented (i.e., personal) second person pronouns as well as speaker-oriented first person pronouns and object/ other-oriented noun phrases (e.g., *your mother*, *your kidneys*). Intensifiers, noted in the lower left of Figure 2.1 are not structurally required to construct a grammatical MAE, but appear frequently enough to warrant mention. Downtoners and other adverbials are vanishingly rare in this position. Lastly, complement type has already been characterized as variable with reference to Van linden's descriptive work.

In addition to providing most of the expository research on MAE, Van linden and Davidse are also responsible for the only known, large-scale corpus study of MAE forms. I limit the discussion to follow to their findings pertaining to importance-type MAE (i.e. MAEs containing adjectives of importance such as *critical, crucial, important*, etc.), as Van linden and colleagues attribute the vast majority of MAE's deontic/ directive interpretations to these forms. Their work, which examines the alternation between infinitival and tensed verb forms in the CEMET/ COBUILD corpora of British English, suggests that importance-type MAE began as an exclusively deontic construction. Over time, the finite form developed evaluative uses, where mental verbs such as *know, consider*, or *understand* provided a bridging context

for these functions (i.e., *it's important to consider that you're feeling better* → *it's important that you're feeling better*). These evaluative uses did not impose obligation on a modal agent but rather expressed the speaker's stance relative to a proposition under discussion. Van linden and Davidse (2009) contextualize this finding with the observation that tensed verb forms have valuable truth conditions, while infinitive forms do not (as a function of their subject-less complement clause). This leads them to assert that synchronic variation between infinitival and finite MAE is grounded in the speaker's pragmatic commitment to the MAE complement. In the case of finite MAE, they claim that the speaker is generally presenting his/ her evaluative stance on the propositional content of the MAE complement (Van linden & Davidse 2009, & Verstraete 2010). Conversely, for infinitival uses, they assert that speakers are conferring a deontic imperative, one in which the modal agent can either remain unspecified (and be understood in a general *one must* sense) or be introduced by a prepositional/ noun phrase (e.g., *it is important for you...*). The current study, with its overarching emphasis on recommendations, will only examine importance-type MAE. Future uses of 'MAE' will refer solely to importance-type MAE forms unless otherwise specified.

Van linden and Verstraete (2010) further integrate their observations into a taxonomy for MAE, where semantically weak importance-type forms (e.g., *important*) have a core evaluative meaning and semantically strong adjectives (e.g., *crucial, critical*) have an inherently deontic meaning. Both types are subject to infinitival/ tensed verb alternation and its associated pragmatic implications within their respective categories. No known studies confirm this interpretation of MAE forms with perception data, either through observational or experimental means. In fact, my judgement study (Chapter 3) provides evidence against Van linden's mappings, at least in the context of medical consultations.

2.4 MAE's semiotic hitchhikers

Thus far I have assumed for convenience that MAE's structural variants contribute to and wholly constitute its social meanings. Yet sociolinguists are increasingly taking the per-

spective that structural variants must be analyzed with reference to their greater linguistic environment. In natural speech, MAE is not an isolated bag of syntactic and semantic features. Instead, it is embedded in rich discourse and realized as an idiosyncratic string of phonetic elements. Though the theoretical and methodological frameworks necessary to investigate MAE's discourse relationships are underdeveloped and insufficient for my current purposes, it is possible to investigate the sociophonetic and/ or prosodic quality of MAE tokens. In fact, such an endeavor would allow for a more thorough account of pragmatic layering as it occurs in MAE. One could ask, for example, whether or not structural and phonetic aspects of MAE co-vary with the same social factors in comparable ways. Positive evidence of such co-variation could suggest that structural and phonetic/ prosodic MAE features are being used as complementary resources in physicians' creation of interactional styles. Without looking at MAE's phonetic/ prosodic context, the analyst might miss many important nuances, such as a prosodic contour that serves to downtone a strong MAE structural form, a voice quality that increases the imperative force of a weak MAE structural form, or indeed a prosodic/ phonetic feature that lends additional social meaning to the MAE token: perhaps a meaning that is unrelated to imperative force at all.

That being said, before engaging the issue of MAE variation across multiple levels of the grammar, the relationship between MAE's structural and prosodic/ phonetic features deserves further qualification. I have defined MAE in terms of its syntactic and semantic features—its complement type, its embedded verb type, its modal agent structure, etc.—identifying these features as primary elements of the MAE construction. Phonetic and prosodic features, by contrast, are not essential elements of MAE. Adopting Mendoza-Denton's (2011) terminology, phonetic and prosodic features are possible "semiotic hitch-hikers" on the MAE construction. Mendoza-Denton puts forth two criteria for semiotic hitchhiking: these features must 1) lack a "vehicle", an independently pronounceable form, on which to travel through the sociolinguistic system and 2) "[travel] with other ideologized and pragmatically salient elements that are considered to be part of a style/ stance/ persona"

(2011:263). As applied to MAE, semiotic hitchhiking features are not inherent to MAE form or function, but they are nonetheless capable of modifying its pragmatic and/ or stylistic interpretation.

Two features will be considered as potential MAE hitchhikers in the course of the current study: rising intonational contours and creaky voice. These features fulfill Mendoza-Denton's first criterion in that they cannot exist without an anchoring structure/ unit, either an utterance, a lexeme, or (conceivably) an isolated phone. Perhaps less trivially, I argue that they have the potential to satisfy her second criterion as well. Both rising contours and creak have an extensive sociolinguistic literature associated with them. As opposed to other features that might have been selected for inclusion in this study, the social ideologies of rises and creaks have been well established for a variety of populations and contexts. Furthermore, the respective salience of these features has been attested in the stylistic construction of interactional personae. Key findings with respect to the sociolinguistic salience of rising intonation and creaky voice are presented here with a focus on demonstrating fulfillment of Mendoza-Denton's (2011) second criterion for hitchhiker status. Additional literature is provided in the context of my perception (Chapter 3) and production (Chapter 5) experiments.

2.4.1 Rising intonation

Intonation, as defined by Ladd, is the "use of *suprasegmental* phonetic features to convey 'postlexical' or *sentence-level* pragmatic meanings in a *linguistically structured* way" (1996:6). By qualifying intonation as *suprasegmental*, Ladd focuses on the phonetic parameters that are typically used in characterizing intonation: pitch (F_0) and stress. Neither of these qualities are contrastive at the phoneme level in English. Accordingly, he goes on to associate intonation with 'sentence-level' meaning. This is not to say that intonation cannot impact the interpretation of sub-clausal constituents (see Ward & Hirschberg 1985 on rise-fall-rise contours; a.o.), but it suggests that clausal interpretation is impacted by intonation regardless of what is or is not affected at the sub-clausal level. The clausal or sentential nature

of intonation's effect bears on the current study in that MAE is also defined at the clause-level. Thus, an intonation pattern applied to an MAE form influences the interpretation of the entire MAE construction. Lastly, Ladd asserts that intonation is *linguistically structured*. Again, this is key to the present work insomuch as it establishes the contrast between intonational variation and structural variation as a grammatical distinction.

Though this research largely attends to the sociolinguistic meanings of intonation contours as opposed to their linguistic structures, a basic understanding of intonational phonology's terms and units is a necessary preliminary to the discussion of intonational pragmatics. Pierrehumbert's (1980) canonical description of intonational patterns provides such an inventory. Pierrehumbert's system is built on two tones: high (H) and low (L). H and L can map to stressed syllables or unstressed syllables, where stress is indicated with '*'. For example, L*⁻H denotes a relatively low pitch stressed syllable followed by a rise on the post-stress syllable. Pierrehumbert outlines several tonal combinations that map onto the metrical structure of a clause. Additionally, she defines two boundary tones, H% and L%, that occur phrase initially and/or phrase finally. Subsequent scholars have generally adopted Pierrehumbert's taxonomy. As suggested earlier, this study will be primarily concerned with -H, H*, and H% as the building blocks of rising intonational contours.

Numerous scholars have attempted to associate discrete meanings with intonational patterns. They have employed widely variable approaches with different underlying assumptions. Nonetheless, with regard to phrase-final rising contours in particular, much of this research has pointed to connotations of uncertainty or incompleteness. Focusing first on uncertainty, Ohala straightforwardly associated rising contours with affective and/ or attitudinal displays of hesitancy, claiming "it seems safe to conclude that such social messages as deference, politeness, submission, lack of confidence, are signaled by high and/ or rising F_0" (1984:2). Later authors have made more measured proposals limited to certain linguistic environments or sub-interpretations. For instance, Ward and Hirschberg (1985) presented an analysis of fall rise contour (L*+H⁻L⁻H%) that involved a specific kind of uncertainty:

questioning as to whether or not a given discourse contribution is relevant with respect to a contextually supplied scale. They framed this analysis in terms of conventional implicature, where the uncertainty associated with rise fall could be detached[4] but not cancelled (Grice 1975). By offering a derivable, semantically based analysis, Ward and Hirschberg demonstrated that their rise contour of interest interacted with linguistic structure in a meaningful way. In a similar, albeit more general vein, Gunlogson (2001) gave an analysis of rising declaratives (e.g., *It's snowing outside?*) that further developed the semantics/ pragmatics of rising contours. She argued that rising declaratives commit the addressee—as opposed to the speaker—to the proposition expressed. In a sense, a declarative rise is saying "correct me if I'm wrong" to the addressee. In order to be interpreted as a question, where such questions are the focus of Gunlogson's work, the context of a rising declarative must exclude the possibility of 'telling' (Gunlogson 2001:76). That is to say, the utterance must be uninformative. This is clearly not the case for MAEs, which as a sub-type of directive, are inherently informative. Nonetheless, Gunlogson's taxonomy for rising/ falling declaratives and interrogatives is still pertinent to MAE in that it associates rising intonation with a lack of speaker commitment, placing the burden of commitment on the addressee instead. Thus rising, informative declaratives (assumedly including a subset of MAEs) commit the addressee to a proposition while still expressing the speaker's uncertainty with respect to said proposition. This implication integrates prior claims from Bartels (1997), Bolinger (1982, inter alia), and others (see Gunlogson 2001:145 for a review) that rises convey an uncommitted stance.

In addition to the referential or pragmatic meanings posited for intonational rises, Tyler (2012) described a discourse-organizing, textual function for clause final rises. He reports on a series of production and perception experiments wherein rises are shown to convey continuation, stringing utterances together in like form to nominal lists. This is similar to Pierrehumbert and Hirschberg's (1990) analysis of rises as signals for elaboration insomuch

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[4]A detachable meaning, according to Grice (1975), is not tied to a certain expression or its truth-conditional equivalents.

as both studies suggest that final rises impart incompleteness. Sacks, Schegloff, and Jefferson (1974) offer another related perspective in demonstrating the use of final rises as turn-holding devices. Though distinct, these discourse meanings for rising intonation are not mutually exclusive with its stance modifying meanings in that a given rise could have both a referential and a textual interpretation.

Against the backdrop of phonologic and pragmatic work on rising intonation, sociolinguists have investigated the meaning of rises in socially contextualized interaction.[5] McLemore (1991), for example, analyzed the use of rising, level, and falling intonational contours in the speech of sorority girls. She found that L*H was used to indicate continuation, one of the textual uses noted above, but that this continuation meaning was subject to local interpretation. It could additionally function as a request for confirmation of comprehension or approval. When issued by a low status member, such as a pledge in the sorority context[6], these requests often appeared to index insecurity, soliciting the approval of higher status members. As uttered by a high status member however, the request-like function of rising contours indexed interactional power, whereby the speaker implemented her authority to keep the floor and confirm comprehension from lower status members. McLemore's work suggests that speakers' interactional roles impact the functional interpretation of rising contours, substantially complicating the picture of intonational meaning.

Podesva's (2011) intra-speaker study of situation-based variation in intonation contour use further developed the concept of locally instantiated intonational contour interpretation. He compared and contrasted three speakers' uses of falling, level, and rising contours across three situational contexts: social situation in a group, social situation one-on-one, and pro-

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[5]This review notably omits work from dialects other than American English. Warren (2005) and Britain (1998), studying New Zealand English, as well as Fletcher (2002) and Guy et al. (1986), studying Australian English, have explored intonational patterns outside of American English and found rises to be distinct in both distribution and interpretation from those described for American English, making them incomparable to the data presented as part of the current study.

[6]A "pledge" is a new member who is still in the process of earning her permanent, more statusful position in a sorority.

fessional situation one-on-one. With respect to rising contours, he highlights one particular speaker's distinctive use of rises in the professional, one-on-one situation. This speaker, under the pseudonym Heath, is of special interest to the current study not only because of his stylistic use of rises, but because he is a medical student whose professional situation is a patient consultation. Health is found to use proportionally more utterance final rises in his patient interaction than in his other contexts.[7] Podesva interprets this result with regard to both McLemore's (1991) claims and the literature suggesting that rises convey uncertainty. He argues that Heath is utilizing rises as a politeness strategy, attempting to "put his patient at ease" in the asymmetric pragmatic context of physician-patient interaction (Podesva 2011:245). As evidence for this, Podesva points to the types of conversational acts that Heath tends to realize with rising intonation. They collectively represent directives and requests, potential indices of physician authority. Thus Podesva suggests that Heath uses rises, along with other mitigating features, to construct a "caring doctor" persona, through which he expresses concern for his patients' well-being and actively downplays the asymmetry of the doctor-patient relationship (Podesva 2011:246). With regard to the present work, Podesva's study establishes that rising intonation serves as a sociolinguistic resource for physicians' in-office identity work. Furthermore, his research alludes to a possible ideological relationship between the use of rises and directive speech acts, providing a basis for its consideration as one of MAE's semiotic hitchhikers.

2.4.2 Creaky voice

Creak is a non-modal voice quality defined by its low frequency and attenuation of glottal pulses (Hollien et al. 1966; Ladefoged 1993; Geratt & Kreiman 2001; Redi & Shattuck-Hufnagel 2001; a.o.). From a distributional perspective, creak is linked to declination, the continuous drop in pitch across declarative sentences (Henton & Bladon 1988; Podesva

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[7]More specifically, Podesva analyzes Heath's use of high rising terminals (HRTs). HRTs represent a subset of utterance final rises of the form H*⁻H% whose particular uses and social meanings are further discussed in Chapter 3.

2013a). In addition to its phonologic/ phonetic determinants, creak has become associated with stylistically meaningful speech, especially in American English-speaking teenage females (Podesva 2013a). It has captured public attention for its use and discussion in popular media, where said discussion has variably focused on creak's capacity to mark teen-speech, female-speech, or vocal cord damage (e.g., Khazan 2014, Fessenden 2011). Said media portrayals have been primarily negative evaluations of the feature's use. For example, Khazan (2014) attempts to summarize views on creak in terms of a heuristic directed at women: "... while women might consider dropping their voices to seem stronger, it appears they shouldn't let them dip too far, lest they enter the treacherous [creak] range". Despite the media's seemingly straightforward opinion on creak, the confluence of its phonetic, prosodic, and social constraints make individual uses difficult to characterize from a researcher's perspective. Nonetheless, the potential interactional significance of creak as a complex articulatory and stylistic phenomenon establish it as an attractive target for variationist research. For the purposes of the current study, creak is of particular interest insomuch as it is complementary to rising intonation, marking stance at low F_0 values.

At the most basic level, creak is a phonetic phenomenon. It is an acoustic correlate of an articulatory state: the "bunching" or adduction of laryngeal folds at the lowest point in one's register (Podesva 2007; cf. Esling 1984; Childers & Lee 1991; Slifka 2006). It manifests as pulsations in the speech signal, where said pulsations are more generally described as glottalization (Wolk et al. 2012; Redi & Shattuck-Hufnagel 2001). Superficially, creak appears to be phonetically simpler than rising intonation in that it has a single, readily identifiable acoustic pattern. Recent research has suggested, however, that there are multiple phonetic realizations of creak based on the timing of glottal movement and associated airflow patterns (Podesva 2013b). It may be the case, as suggested for sub-types of rising intonation, that these phonetically distinguished creak types have distinctive social and interactional meanings, but research has yet to demonstrate a correlation.

Creak can be further compared to rising intonation in terms of its association with a

specific pitch contour. It tends to occur at the end of falling, declarative contours where "favorable aerodynamic conditions for modal voicing have faded" (Podesva 2013a:431) and low fundamental frequencies are expected. As discussed above, declarative prosody is analyzed as a marker of speaker commitment (Gunlogson 2001). Declarative statements commit speakers to their content, creating a pragmatic link that can be manipulated in discourse. Similarly, creak has been mapped to the expression of evaluative stance, where a speaker indicates his/ her position relative to the propositional content of an utterance (Dilley et al. 1996; Lefkowitz 2007). Dilley and colleagues found that newscasters marked epistemic authority with this feature, while Lefkowitz reported a similar finding for college students. Applying this frame, creak seems to function synergistically with its structural environment. This relationship does not explain the entirety of creak's role in identity construction, however, as other researchers have linked creak with displays of weakness and emotionality (Wilce 1997) as well as negative attitudes (Grivicic & Nilep 2004) and untrustworthiness (Anderson et al. 2014).

The primary claim in the sociolinguistic literature—insofar as one can be identified—is that creak is a form of expressive meaning, one that marks speaker identity and indexes locally salient group identities. For instance, researchers have implicated creak in the establishment of a diva persona (Podesva 2007) as well as the assertion of toughness in Latina gang members (Mendoza-Denton 2011). More globally, it seems to manipulate gender stereotypes, covertly pointing to masculinity in an indirect, highly contextualized fashion. Creak's association with female speakers (Eckert & Podesva 2011) furthers this claim, showing the significance of gender and the indirectness of its invocation (Podesva 2013a). Manipulation of gender, a societally defined concept, is interpreted as "toughness" (Mendoza-Denton 2011) or "prissiness" (Podesva 2007) in appropriate, locally constructed contexts. It can also intersect professional identity in the construction of female "upward mobility" and "educated urban professional" womanhood (Yuasa 2010). In this sense, creak is a linguistic resource for ldentity construction, one with a core sense and limitless local variants (Eckert 2008).

2.5 Overview of the study

Having described MAE as a variable and provided potential medical and sociolinguistic motivations for its study, the remainder of this dissertation presents a series of experiments on MAE perception and production in physician speech. The perception study will provide listener evaluations of MAE in the physician-patient context, and these will form the basis for my interpretations of the social and linguistic constraints on MAE production. Together, the analyses of perception and production will inform my discussion of physician style. The relationship between my perception and production experiments is represented diagrammatically in Figure 2.2.
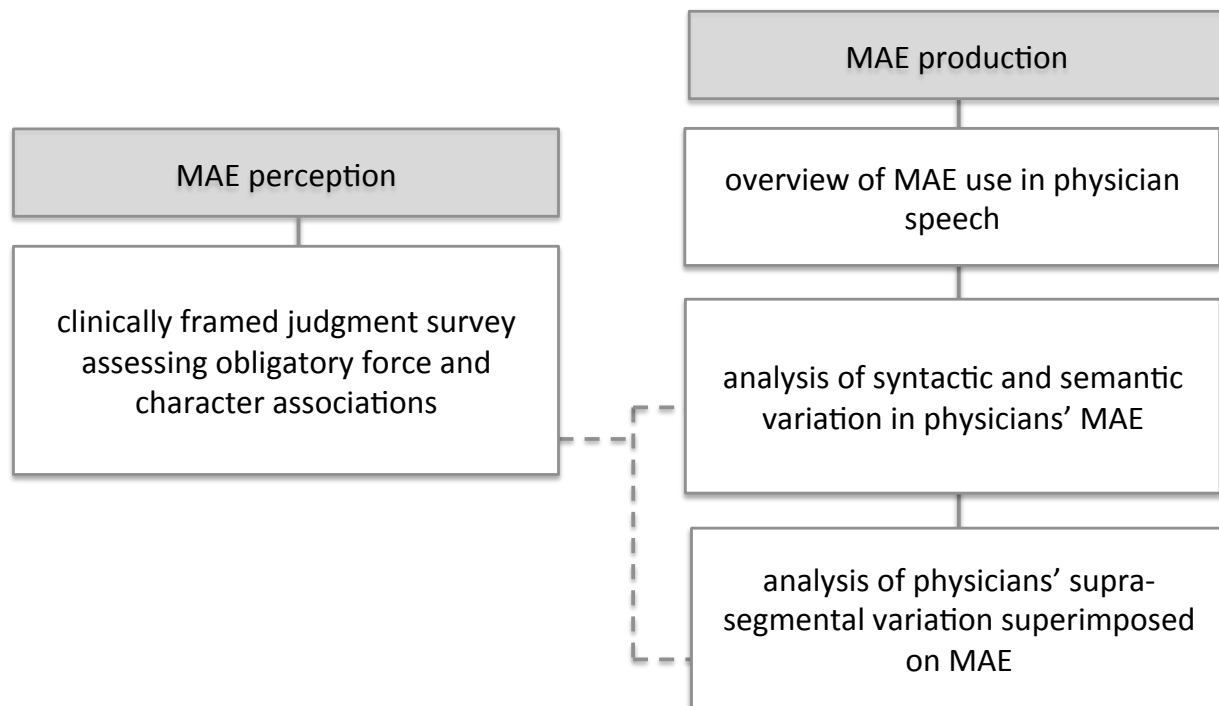
Figure 2.2 A schematic representation of the experiments reported in this dissertation.

My perception experiment, detailed in Chapter 3, empirically links MAE features with obligatory force values and assesses the interactional significance of these associations. It builds a foundation for the study of physician MAE use in its natural context, employing clinical frames and scenarios to invoke situationally dependent interpretations. As discussed

above, such an exercise is necessary to determine the precise meanings of MAE forms under the macro-pragmatic assumptions of physician-patient interaction.

My two production studies, reported in Chapters 4 and 5, analyze MAE's inherent and superimposed variant features in a sample of recorded medical consultations. These experiments address linguistic and social questions related to physicians' manipulation of MAE as a pragmatic and stylistic resource, quantifying co-variation across MAE features and interpreting feature clusters with respect to the construction of interactional personae. Furthermore, they work towards a characterization of physicians' social structure and interactional pressures based on their sociolinguistic behavior.

After reporting and individually discussing the results of my three major analyses, I provide integrative implications in Chapter 6. Here, I return to several of the broad-scope issues introduced in Chapters 1 and 2. I highlight key takeaways for sociolinguistics and medicine, drawing connections between MAE's various features, interactional functions, and social meanings.

Chapter 3

MAE perception

To understand the value of MAE variants in physician-patient interaction and to provide an empirical test of existing claims pertaining to MAE evaluation, I designed and fielded a judgment task in survey format. This task addresses both the pragmatic and stylistic interpretation of MAE, investigating the effects of isolated MAE features on participants' assessment of MAE force as well as physician character. The resulting ratings of MAE force are used as an interpretive frame for the production study to follow, while the physician character judgments provide a means by which to translate linguistic variation into socially contextualized style.

3.1   Objectives and hypotheses

The primary objective of my perception experiment is to decompose the pragmatic and social meanings of MAE into individually variable parts. More specifically, this study will assign strong or weak imperative force values to MAE features and determine the extent to which differences in imperative force are socially meaningful. By operationalizing MAE evaluation as a feature-based, compositional system, it is possible to delineate strong and weak aspects of a given MAE form while maintaining the intuition that said form has a unified, gradient pragmatic interpretation. A feature-based framework also lends itself to the exploration of identity construction, whereby independently valued features can be manipulated to create a coherent interactional persona. Carrying forward the notion of evaluative compositionality, my hypotheses associate the MAE features described in Chapter 2 with either strong or weak relative values (Sub-section 3.1.1) and generate social predictions based on this strong-weak dichotomy (Sub-section 3.1.2).

3.1.1 Hypotheses for imperative force

The following hypotheses are framed as feature-based predictions of MAE strength to reflect the fact that variants will be analyzed as pairwise distributions of participant strength ratings comparing individual feature contrasts. The basis for each hypothesis is discussed in turn.

(10) **Hypothesis 1**: infinitival MAE forms (e.g., *it's important to exercise*) will be rated as significantly stronger than finite MAE forms (e.g., *it's important that you exercise*)

The hypothesis given in (10) refers directly to the syntactic-pragmatic contrast described by Van linden and Verstraete (2010). As detailed in Chapter 2, Van linden and Verstraete put forth the theoretical claim that infinitival forms are exclusively deontic, thus implying that they are consistently imbued with some degree of imperative force. They contrast these forms with finite structures that have both deontic and evaluative uses (see Chapter 2). Said evaluative uses have no inherent imperative character. By extension, the pragmatically heterogenous set of finite forms might, as a whole, be expected to have less imperative force. (10) formalizes this line of reasoning as derived from the MAE literature.

Despite the fact that (10) is drawn from the MAE literature, it is somewhat counter-intuitive from a more general perspective. Infinitival forms that do not supply a modal agent are less specific than their finite counterparts for which modal agents must be provided. The infinitival forms represent generalizations, where generalizations permit individual exceptions. For example, one might think that *it is important to exercise* does not apply to him/her, the hearer, based on a principled reason. Such exceptions are not tolerated for finite forms. *It is important that you exercise* applies directly to the hearer and cannot be denied without contradicting the speaker. Nonetheless, for the sake of consistency, (10) tentatively adopts the position presented in the MAE literature.

(11) **Hypothesis 2**: MAE forms with explicit, hearer-oriented modal agents (e.g., *it's important for you to exercise*) will be rated as significantly stronger than MAE forms lacking an explicit modal agent (e.g., *it's important to exercise*)

Though there is no known literature on types of modal agents in MAE, general work on deontic modality suggests that the assignment of imperative force is dependent on the identification of an individual or set of individuals to whom obligation or permission is being applied (Verstraete 2005; a.o.). Intuitively, if a speaker identifies the hearer as the modal agent (i.e., individual assuming obligation, see Chapter 2) of an MAE form, the hearer is more likely to perceive a personally relevant obligation than if s/he had not been explicitly referenced. In other words, (11) is intended to capture the difference between "you must do this" and "one must do this", where the former form may be interpreted as having more imperative force from the perspective of the hearer.

(12) **Hypothesis 3**: MAE forms featuring action verbs (e.g., *it's important to diet*) will be rated as significantly stronger than MAE forms featuring mental verbs (e.g., *it's important to consider dieting*)

As with (11), there is no direct evidence supporting the notion that mental verbs (e.g., *think*, *consider*, *feel*) confer less imperative force than action verbs within MAE constructions. However, Van linden and Davidse (2009:197-200) do suggest that mental verbs served as a bridging, intermediary step in the diachronic development of non-deontic, evaluative MAE uses. Rather than compelling the hearer to perform an action, mental verbs invite the hearer to attend to a given state of affairs. As summarized in Chapter 2, Van linden and Davidse argue that this "please attend to X" context eventually led to the emergence of non-modal, truth evaluable MAE complements. Based on this trajectory, mental verbs are related to MAE's non-modal or weakly modal interpretations. (12) restates this diachronic relationship as a synchronic hypothesis, predicting that the non-modal associations of mental verbs may lead to weaker perceptions of imperative force for mental verb containing forms.

(13) **Hypothesis 4**: intensified forms (e.g., *it's extremely important to diet*) will be rated as significantly stronger than non-intensified forms (e.g., *it's important to diet*)

Again, there are no specific studies of intensification within MAE. Nonetheless, intensifiers represent a grammaticalized system of adverbial modifiers that amplify meaning (Ito & Tagliamonte 2003). Assuming a compositional model of illocutionary force, intensifiers would be expected to strengthen the pragmatic meaning of a clause relative to its non-intensified form. (13) expresses this inference with respect to MAE.

(14)   **Hypothesis 5**: forms featuring declarative intonation will be rated as significantly stronger than forms featuring rising intonation

Once more, there does not appear to be any published work on MAE intonation. That being said, Podesva (2011) reports a case study of intonation contour use in physician-patient interaction. Podesva observes an increased use of high rising terminals (HRTs)—pitch increases on the final syllables of syntactically declarative clauses—when a student doctor is "offering explanations, [issuing] warnings, or asking for permission" (2011:245). He associates this pattern with the more general finding that HRTs act as hedging devices (Lakoff 1973; McConnell-Ginet 1983; a.o.). Stylistically, he suggests that HRTs contribute to the speaker's construction of a 'nonthreatening', 'caring doctor' persona. If this is the case, as is assumed in (14), HRTs superimposed onto MAE variants in the current study might be expected to weaken perceptions of imperative force.

(15)   **Hypothesis 6**: forms with utterance final creak will be rated as significantly stronger than forms without utterance final creak

In analogy to HRT, vocal creak (sustained low fundamental frequency with an attenuation of glottal pulses, see Section 2.4) is associated with weakness (Wilce 1997) and negative attitudes on the part of the speaker (Grivicic & Nilep 2004). However, the meanings proposed for creak appear to be less consistent than those attributed to HRT, both in terms of their social value and their distribution across communities. For example, Mendoza-Denton (2011) describes Latina gang members' use of creak to portray toughness, in apparent opposition to Wilce's (1997) claims regarding creak as a marker of emotionality and vulnerability in patient

speech. Furthermore, as described in Section 2.4, Lefkowitz (2007) and Dilley et al. (1996) link creak to the establishment of an authoritative stance. This contrasts with Anderson et al.'s (2014) results demonstrating creak's association with untrustworthiness in female professionals. For lack of prior research on physician use of creak or on creak in the context of MAE, (15) draws from Lefkowitz (2007), Dilley et al. (1996), and Mendoza-Denton's (2011) conclusions in predicting that creak will strengthen imperative force perceptions.

3.1.2 Hypotheses for the social interpretation of imperative force

The hypotheses given in (10)-(15) conceptualize MAE's pragmatic force as the main linguistic variable of interest in this dissertation. This variable has two main variants: strong pragmatic force and weak pragmatic force, henceforth referred to as MAE's 'strong' and 'weak' variants. Although these two functional variants are realized using a variety of surface forms, the pragmatic contrast between strong and weak is consistent, allowing for discussion of MAE's social interpretation in terms of this contrast. Hypotheses (16) and (17) describe predictions for strong and weak variants as contrasts across two social dimensions: physician competence and physician empathy. Seeing that no previous work exists on the social evaluation of MAE in physician speech, both of these hypotheses will be based on related sociolinguistic and communications research in medical contexts.

(16) **Hypothesis 7**: Speakers of strong MAE forms will be rated lower in physician empathy than speakers of weak MAE forms.

In a matched guise task using physician speech, Hasty (2012) finds that double modals (e.g., *might could*) were more likely to be evaluated positively as *likable*, *trustworthy*, *polite*, and other solidarity-based characteristics, than were single modals. Hasty et al. (2012) characterize double modals as negative politeness devices used to mitigate directives and weaken stances in physician-patient interaction. Assuming that weak MAE forms are performing a similar mitigating function relative to their strong counterparts, Hasty's work leads to a prediction that weak MAE forms may contribute to perceptions of physician likability and

genuineness, attributes that may factor into an empathic persona. By contrast, strong MAE forms may have a face-threatening effect insomuch as they highlight the asymmetric nature of physician-patient consultations, projecting an authoritative physician persona. (16) operationalizes this reasoning with respect to a speaker-oriented measure of physician empathy.

(17)   **Hypothesis 8**: Speakers using strong MAE forms will be rated higher in physician competence than speakers using weak MAE forms.

Ogden et al. (2002) investigated the effects of verbally expressed uncertainty on perceptions of physician confidence. Using hypothetical scenarios presented in a survey task, they found significant downgrades in confidence scores for explicit knowledge disavowals (e.g., *I don't know*) as well as epistemic hedges (e.g., *I think it might be...*). To the extent that weak MAE forms function as hedges, they may also mark uncertainty. If this is the case, weaker MAE forms would be expected to contribute to lower scores on a speaker-oriented measure of physician confidence, as suggested in (17).

The following Section describes the methods by which I tested (10)-(17). I will refer to these hypotheses specifically as I detail the various sub-tasks of my perception study and in the subsequent discussion of my results.

3.2   Methodology

My survey-based perception experiment consisted of two conceptually distinct parts (scenario and rating segments) that were further sub-divided into discrete tasks. Sub-sections 3.2.1 and 3.2.2 characterize the intent and design of the two survey parts. Particular attention is paid to the rating tasks in Sub-section 3.2.2, as these tasks produced the quantitative results reported in Section 3.3. Sub-section 3.2.3 describes the demographic and post-task questionnaires associated with the survey. Finally, Sub-section 3.2.4 outlines the practical aspects of sampling, administration, and analysis with respect to the overall experiment.

3.2.1 Scenario tasks

The first portion of the survey asked participants to imagine themselves in medical roles, first as a physician and then as a patient, while responding to a series of medically-themed scenarios. For each scenario, participants selected the MAE forms they would prefer to use or receive, thus generating categorical, count-type responses intended to complement the quantitative rating tasks detailed in Sub-section 3.2.2. All of the physician and patient scenarios used in this segment of the survey are documented alongside their potential responses in Appendix A.

The physician roleplaying task specifically targeted perceptions of MAE strength (i.e. imperative/ obligatory force) as a function of social appropriateness. Participants were introduced to the task of pretending to be a physician and given the instructions shown in (18).

(18) Your responsibility is to encourage patients to act in ways that are beneficial to their health. For each situation, provide your patient with appropriate instructions by selecting one statement from the options provided.

The first statement in (18) was aimed at establishing the goal of the task: compelling hypothetical patients to act in a certain way. The second statement was designed to invoke the notion of situational appropriateness, further suggesting that participants were to assume the role of a dutiful consultant.

Following the instructions shown in (18), participants were presented with a series of scenarios, as shown in (19), and asked to select from three or four possible responses.

(19) Jim has diabetes. Sometimes Jim's blood sugar gets dangerously high. If Jim's blood sugar becomes too high, he could die. Regular blood sugar checks prevent Jim's blood sugar from becoming too high

The life/ limb-threatening situations exemplified in (19) were made to be uniformly and purposefully dramatic in an effort to elicit the strongest MAE forms. In other words, they

were intended to create a sense of urgency or necessity that would warrant an unambiguous imperative from a physician. Responses included minimally contrastive MAE feature variants (e.g., *It's important to check your blood sugar* and *it's important that you check your blood sugar*; or *it's important to consider exercising* and *it's important to exercise*) for which differential ratings would be expected based on (10)-(13). The hypotheses given in (14) and (15)–those that pertain to prosodic/ phonetic features–were not tested in this task as to maintain a single modality (i.e., reading) across scenarios.

In addition to the life/ limb-threatening scenarios illustrated by (19), I also tested scenarios like the one shown in (20).

(20) You're concerned about Jan's lack of activity. She tells you that she "lays around on the couch all day". This isn't good for her, but the last time you suggested that she get some exercise, she looked offended.

In contrast with (19), (20)-like scenarios featured lines about the patient 'getting offended' or 'calling you rude'. These politeness-oriented questions served as fillers with respect to the life/ limb-threatening scenarios in the sense that they did not straightforwardly assess MAE strength. Though they were not directly linked to (10)-(13), they offered an opportunity to explore the relationship between weak MAE forms and negative politeness. The idea that weak MAE might act as a relative hedges, as presented in the discussion surrounding (16) and (17), was addressed by comparatively direct means in the rating task portion of the survey (see Section 3.2.2).

After completing the physician role-playing task, participants were directed to take on the role of a patient. Their specific instructions are shown in (21).

(21) In the next scenario, pretend you are a patient. You're visiting your doctor for the first time after having a heart attack. Your doctor is concerned that you may be at risk for another heart attack in the future. He prescribes several medications for you to take. You can only afford one medication from each category. Choose one pill to buy from each category.

a. Your doctor says: "It's important to take the purple pills... It's important that you take the gray pills."

The "categories" referenced in (21) included two pill options, each presented using a different MAE form (see 21a). Participants selected from two possible responses: "buy the X pills" and "buy the Y pills", where X and Y were category-specific colors. As with the life/ limb-threatening scenarios described in the preceding task, these forced decision questions were worded as to indirectly elicit stronger MAE forms, thus differentiating stronger forms from their weak counterparts. Assuming that participants were actually referencing a cline of imperative force while completing both role playing exercises, one would expect the results of the two tasks to be consistent: participants would be inclined to both "prescribe" and "buy" in terms of the strongest MAE form.

3.2.2 Rating tasks

Following the two role-playing segments, participants quantitatively rated a variety of MAE forms representing the contrasts given in (10)-(17). Each MAE form, given in a random order, was presented with the same predicate: *exercise* (e.g, *it's important for you to exercise*). Though the majority of these stimuli were written, three audio clips featuring *exercise* were also created and fielded to test the sociophonetic/ prosodic hypotheses of (14) and (15).

Participants gave their ratings with respect to five parameters: STRENGTH, BEDSIDE MANNER, OPEN-ENDEDNESS, EMPATHY, and CONFIDENCE, through a series of fixed-order, multiple choice questions. The first parameter, STRENGTH (i.e., imperative force), focused on the actual MAE form as a de-contextualized unit. It was consistently assessed first. The remaining parameters judged a hypothetical physician uttering each MAE form. In contradistinction to STRENGTH, these measures were directed at the social meaning of MAE within the context of physician-patient interaction. Participants were instructed to imagine that they were patients of the physician uttering a given MAE form prior to the presentation of items featuring these socially-oriented measures. Questions belonging to each scale were

intermixed following this introduction.

Both STRENGTH and BEDSIDE MANNER were rated on an ordinal, one to ten scale associated with a framing prompt. Said prompts are shown in (22) and (23) for STRENGTH and BEDSIDE manner respectively.

(22)   Rate the strength of obligation expressed by each "It's..." statement on a scale of 1-5. "Strong" (5) means that you are obligated to perform the recommended action. "Weak" (1) means that you are NOT obligated to perform the recommended action (i.e., it is optional).

(23)   Rate this doctor's beside manner on a scale from 1-10. "Excellent" (10) means that this doctor exceeds your expectations for bedside manner and that you would refer a friend or family member to her. "Poor" (1) means that this doctor does not meet your expectations for bedside manner.

In (22), participants were provided with definitions for both "strong" and "weak" in terms of conferred obligation. Previously conducted pilot studies suggested that these definitions were sufficiently clear and suitable for eliciting imperative force judgments. Though the explanation of "bedside manner" offered in (23) was not piloted, reference to this concept was found to be unproblematic in Hasty's (2012) perception instrument. The statement regarding referral to a friend or family member was added in order to further anchor bedside manner as a desirable physician characteristic for those less familiar with the phrase.

In contrast with STRENGTH and BEDSIDE MANNER, both of which were measured by a single item, the ratings for EMPATHY, OPEN-ENDEDNESS, and CONFIDENCE were based on multiple-item scales. The scales were composed of questions adapted from Smith's (1995) validated questionnaire for assessing patient-centeredness[1] in medical interviewing. Individual questions were chosen for inclusion based on their relevance to the act of recommending.

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[1]Patient-centeredness refers to the prioritization of patient concerns and the active engagement of patients in medical decision-making (e.g., Smith 2002). It can be contrasted with biomedically oriented approaches that maintain an institutionally driven agenda.

Possible responses to all items ranged from "strongly disagree" to "strongly agree" on a four point Likert scale. Example questions are given for OPEN-ENDEDNESS in (24), EMPATHY in (25), and CONFIDENCE in (26).

(24) I would say everything to this doctor that was on my mind.

(25) This doctor would be kind and considerate of my feelings.

(26) I would have confidence in this doctor's abilities.

The complete inventory of items testing each character scale can be found along with the rest of the survey instrument in Appendix A. Based on similarities in the question content of the EMPATHY and OPEN-ENDEDNESS scales, which focus on physician elicitation and appreciation of patient concerns, these scales are considered together in the assessment of MAE's hypothesized empathy associations (see 16). The CONFIDENCE scale, by contrast, is used as the primary measure of MAE's hypothesized competence meaning (see 17).

3.2.3 Demographic survey and post-task questionnaire

Prior to the hypothesis-driven portions of the survey, participants were asked for non-identifying data about themselves. Gender (male, female, or other) and year of birth were assessed to confirm a gender balanced, adult sample. History of chronic illness (yes or no) and overall health quality (excellent, very good, good, fair, or poor) were also collected as qualitative indicators of the degree to which participants made use of medical services. Lastly, medical decision-making preferences were gauged using an adaptation of the Control Preferences Scale (Solari et al. 2013, see Appendix A). This scale measures participants' preferred means of making medical decisions. It asks them whether they would rather be the primary decision-maker (deciding entirely on their own or after considering their physician's opinion) or if they would like their physician to fulfill this role. Said preferences were deemed relevant to a perception study of medical recommendations insomuch as strong tendencies toward physician or patient exclusive decision-making models could impact participants'

judgments. If, for example, the participant sample strongly preferred to make their own decisions without physician advice, they might provide higher strength ratings and lower character trait ratings than a more balanced sample.

Upon completion of the survey, all participants completed a free response exit questionnaire. The questionnaire consisted of six prompts, exemplified in (27) and fully listed in Appendix A.

(27) a. How did you decide what to tell each patient while pretending to be a doctor?

b. How did you select which pill to take when answering questions from a patient's perspective?

c. In general, what contributed most to your impression of the doctor's overall character?

The exit questionnaire focused on participant strategies for answering the various question types encountered in the survey. It was designed to highlight potential methodological flaws in the survey instrument. For example, if participants were selecting pill colors based on the order of their presentation in the patient task, they might describe this strategy in their answers to (27b). An optional, general comment box was also provided as an opportunity for participants to share their thoughts on the survey as they saw fit.

3.2.4   Survey logistics

My entire perception experiment was administered as an online survey. Eligible participants, adults 22 years of age and older, were recruited by students enrolled in introductory linguistics classes via an emailed survey link. Participants were able to take the self-paced survey in a location of their choosing using either a computer or mobile device.

Though demographic data was collected on each participant, no identifying information was retained. IP addresses were logged automatically by the survey distribution website, but

they were discarded prior to analysis. Anonymity was maintained through the assignment of a randomized participant ID.[2]

Beyond the initial pages containing consent information and demographic questions, participants' survey experiences were partially randomized. The potential responses appeared in a random order across item types. Furthermore, within the rating portion, the MAE forms (representing sets of questions) were randomized. Unfortunately, the scenario based questions could not be randomized due to co-dependencies between a subset of scenarios (see Appendix A). The post-task and demographic questionnaires were purposefully excluded from randomization procedures.

All participants were presented with three audio-based stimuli. I created the recordings for these stimuli by reading *it is important to exercise* in three separate guises: a declining intonational contour, a rising intonation contour (approximating a high rising terminal), and a declining intonational contour with pronounced utterance final creak. The pitch contour for the rising intonation recording and the spectrogram for the creaky recording are given in Figures 3.1 and 3.2 respectively. I chose to make these audio recordings myself (as opposed to using naturalistic data) because self-recording allowed me to control the exact realization of the features of interest while controlling for other voice characteristics. I was also able to approximate laboratory quality recordings using this method. Had I relied on naturalistic data, I would have needed to manipulate the audio clips to create comparable guises. Additionally, the recording conditions would have been sub-par, resulting in potentially degraded audio samples. These gains may have come at the expense of some authenticity relative to a naturalistically recorded, in-office physician utterance. I estimate the loss of authenticity to be minimal however, as I was able to draw from my experience interacting with patients as a physician in training. A small, convenience sample of trained linguists reviewed the clips and confirmed their naturalness.

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[2]These recruitment and administration methods were reviewed by the Michigan State University Institutional Review Board and determined to be exempt from further review (IRB# x14-325e).
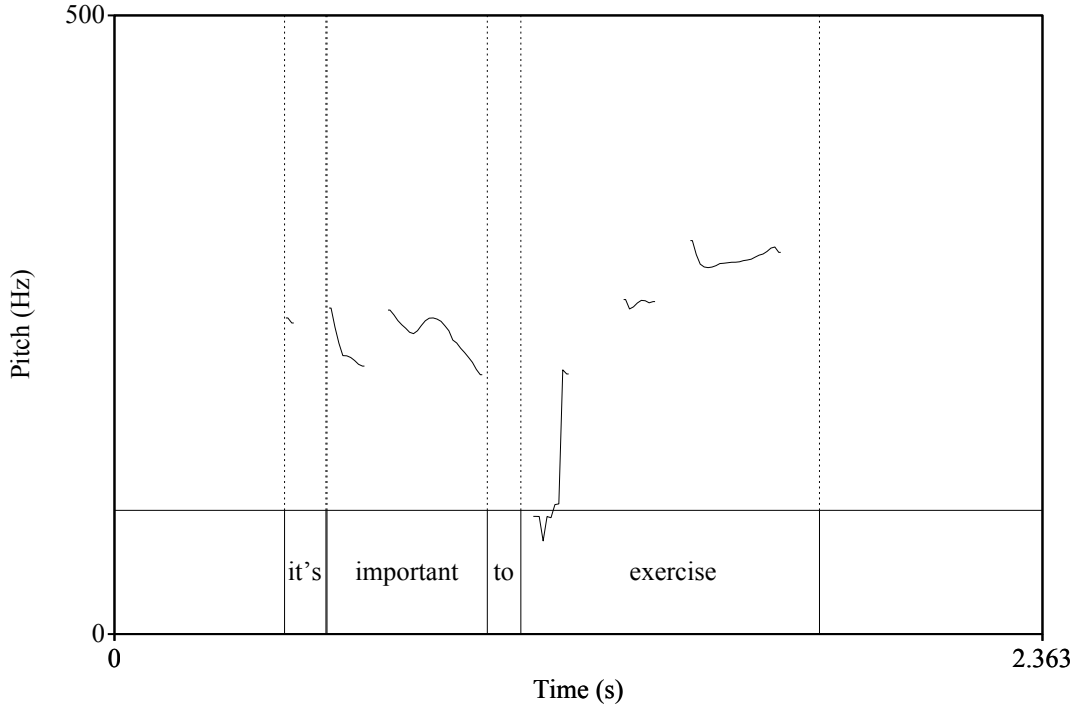
Figure 3.1 The pitch contour of the rising intonation perception task stimulus. An utterance final L*H pattern is demonstrated on the word *exercise.*

Upon completion of the survey recruitment period, survey responses were downloaded in their raw form from the survey distribution website and processed into a usable format. Partial responses and responses from non-native English speakers were removed prior to data work-up. Within the quantitative rating task portion of the survey, scale totals were calculated for the OPEN-ENDEDNESS, EMPATHY, and CONFIDENCE items by converting the Likert scale to a one to four scale with "strongly agree" as the maximum value. The maximum potential score for an individual MAE form was eight for OPEN-ENDEDNESS, twelve for EMPATHY, and eight for CONFIDENCE based on the number of items included for each scale. Two of the seven total items were reverse scored. Scenario-based responses were recoded to isolate the features being tested in each item. Qualitative data from the post-task questionnaire was reviewed and summarized.

My analysis of the processed data file focused on the quantitative rating task. Descriptive
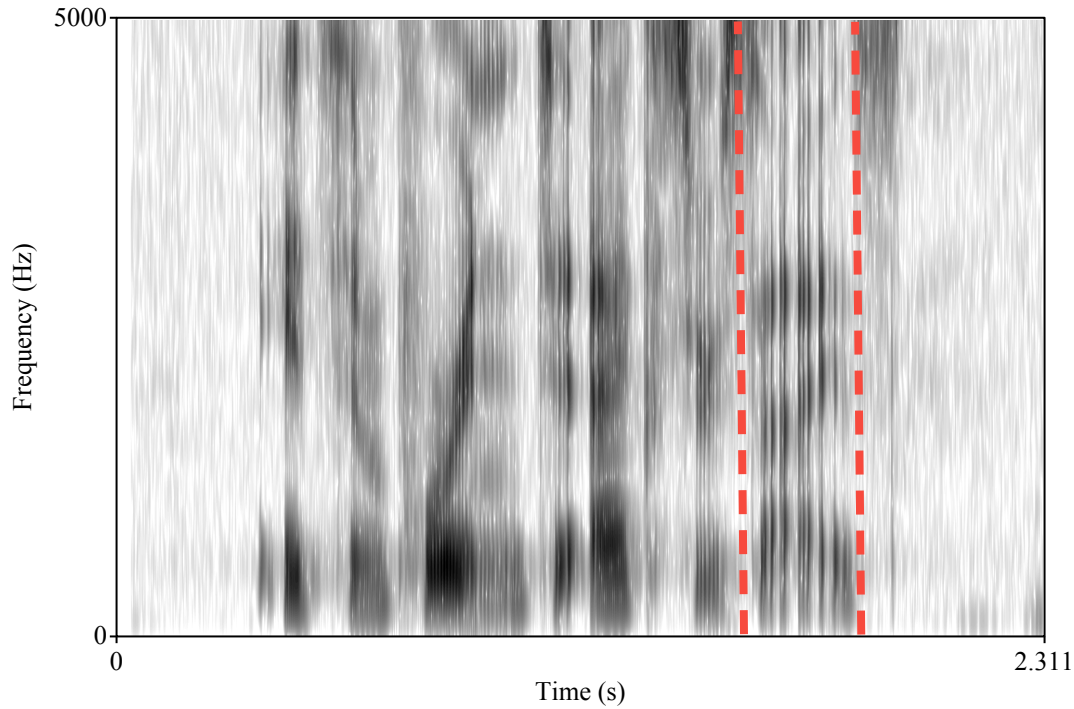
Figure 3.2 The spectrogram of the creaky voice perception task stimulus. Dashed lines highlight the interval where creak is evident, coinciding with the word *exercise* in *it's important to exercise.*

statistics were calculated for each item. Subsequently, the entire section was subjected to a repeated measures ANOVA analysis followed by sets of Tukey HSD post-hoc comparisons. The responses from the scenario tasks were qualitatively reviewed for consistency with these quantitative results.

3.3   Results

I present my perception study results as integrated findings from several discrete tasks within my judgment survey. Sub-section 3.3.1 synthesizes data from the demographic and post-task segments in order to provide an overview of respondent characteristics alongside their meta-commentary on the survey instrument. Similarly, Sub-sections 3.3.3 and 3.3.4 bring together evidence from both the scenario and rating tasks to describe my overall results for

MAE strength and social meaning respectively.

3.3.1 Participant sample

A total of 211 individuals took part in my perception survey. Post-exclusions (see Sub-section 3.2.4), 167 participants were retained for analysis. Table 3.1 displays the basic demographic information reported by these participants along with several health-related variables motivated in sub-section 3.2.3.

Table 3.1 Counts, proportions, and descriptive statistics (where appropriate) for the characteristics of survey participants.

Parameter	Value	$N_{participants}$	Proportion	Mean
Gender	Female	100	59.9	
	Male	67	40.1	
Health status	Excellent	42	25.1	
	Very good	75	44.9	
	Good	42	25.1	
	Fair	7	4.2	
	Poor	1	0.6	
Diagnosed with chronic illness	Yes	22	13.2	
	No	144	86.2	
	Not sure	1	0.6	
Medical decision making preference	Patient only	17	10.1	
	Consider physician opinion	68	40.7	
	Shared	59	35.3	
	Consider patient opinion	18	10.8	
	Physician only	5	3.0	
Age				40.3

Both gender and age were found to be adequately representative of the survey's target population; namely, the production sample to be described in Chapter 4. Though a slight majority of participants identified as female, a similar skew is found in my production data (54% of production data patients were female, see Sub-section 4.1). Likewise, the average

participant age is lower than that of the patients in my production sample (40.3 years compared to 52.3 years), but both groups center upon the 'middle-aged' life-stage.

With respect to medically-related variables, participants characterized themselves as quite healthy and inclined towards shared decision-making. The vast majority of survey participants had never been diagnosed with a chronic illness and labelled their health as "very good" or better. Though I lack a means of direct comparison between survey participants' self reported health measures and the health of the production sample, it is reasonable to assume that most of the production patients have been diagnosed with a chronic disease. With few exceptions, this was the primary reason that they were engaging in a physician consultation in the first place. The contrast between the relatively healthy survey sample and the assumedly unhealthy production sample should be noted, as the production results are interpreted with respect to survey-based perception findings. Relatively few participants expressed preference for either exclusive patient or exclusive physician influence on medical decision-making, where these views represented the extreme ends of the decision-making preference continuum. Again, this may be reflective of the population as a whole or derivative of participants' lack of experience with chronic illness.

In general, participants' post-task comments indicated that they were engaged in the survey and approached its tasks as per my intent; with one minor exception. A few individuals experienced issues with the patient role playing task in particular. They reported selecting the first pill or their favorite color pill whenever they did not perceive a clear linguistic difference between forms. For this reason, and since the overall results of the patient role playing task were similar to those of the physician role playing task, I have excluded the patient-focal, pill selection task from further discussion and/ or summary. Based on participant meta-commentary, the remaining tasks were performed as per expectations and thus included in the findings to follow.

3.3.2 Item comparisons

As noted in Section 3.2, my quantitative rating results were derived from pair-wise comparisons of minimally contrastive MAE features. Table 3.2 summarizes the features that were compared, listing them along with the actual stimuli used for the purposes of statistical analysis. Some stimuli, such as the unmodified finite form, were used in multiple pair-wise comparisons. For example, the finite form was independently paired with the infinitival form and the intensified form to create infinitival-finite and unmodified-intensified contrasts. The stimuli labels given in this Table are referenced in the result summaries below. In order to make the results maximally clear, labels that highlight the contrast of interest (e.g., personal agent as opposed to PP agent for the modal agent contrast) are used whenever possible.

3.3.3 MAE strength perceptions

As a whole, participants indicated that the structural and prosodic realization of MAE impacts its pragmatic interpretation as an illocutionary act. All of the features referenced in Section 3.1 were found to influence MAE's imperative force (i.e., strength), with the notable exclusion of creak (see 15). The means and standard deviations for participants' STRENGTH ratings are reported in the 'Strength' columns of Table 3.3. The effects observed for these feature-specific distributions are reviewed here individually with reference to their associated hypotheses outlined in (10)-(15). They are also summarized in Table 3.4.

Beginning with **Hypothesis 1**, which predicted stronger ratings for infinitival forms (e.g., *it's important to exercise*) than finite forms (e.g., *it's important that you exercise*), a contrast was demonstrated between participants' STRENGTH ratings of infinitival and finite feature values, but in the opposite direction from that predicted in (10). Rather than rating the infinitival form as stronger than the finite one, participants consistently rated and/ or selected the finite form as the stronger variant. As shown in Table 3.4, this effect was sizable in magnitude and of clear statistical significance in the quantitative rating task (Z=-5.834, p<0.001). The doctor role playing task also supported this result, with participants

Table 3.2 Variants, values, and corresponding stimuli for the evaluation survey items. Items used in multiple pair-wise comparisons (i.e., finite, infinitival, and PP agent forms) are given multiple labels to highlight their relevant contrasts. Despite these labels, the same item is being used for the purpose of statistical analysis.

MAE feature	Variants	Stimulus item	Stimulus label
COMPLEMENT	infinitival	*it's important to exercise*	infinitival (no agent)
	finite	*it's important that you exercise*	finite (unmodified)
AGENT	non-personal	*it's important to exercise*	infinitival (no agent)
	personal	*it's important for you to exercise*	PP agent (personal/ action verb)
VERB TYPE	mental	*it's important for you to consider exercising*	mental verb
	action	*it's important for you to exercise*	PP agent (personal/ action verb)
INTENSIFICATION	unmodified	*it's important that you exercise*	finite (unmodified)
	intensified	*it's extremely important that you exercise*	intensified
INTONATION	rising	*it's important to exercise* [with HRT]	HRT
	declarative	*it's important to exercise* [level intonation, no creak]	level
CREAK	creaked	*it's important to exercise* [with creak]	creak
	non-creaked	*it's important to exercise* [level intonation, no creak]	level

selecting finite forms over infinitival ones at a 3:1 margin in life/ limb-threatening scenarios. Importantly, however, neither the role playing nor the rating task could unequivocally distinguish between syntactic complement variation (finite, tensed clause v. infinitival clause) and structurally correlated agent specification. Finite forms necessarily specify a modal agent to satisfy their clause structure, as illustrated by the ungrammaticality of (28b):

(28)   a. it's important that you exercise

       b. *it's important that exercise

Infinitival forms, conversely, need not specify an agent. When an agent is specified in these

Table 3.3 Descriptive statistics for participants' strength and character ratings reported based on the MAE feature represented in a given survey item. Means and standard deviations (sd) reflect scale specific ratings (e.g., for strength, the mean represents participants' average ratings on the 1-10 strength scale). N=167 participants for all calculations.

MAE feature	Strength		Bedside manner		Openendedness		Empathy		Confidence	
	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
infinitival	5.7	2.14	6	1.9	5.63	1	8.35	1.16	5.6	0.94
finite	6.89	1.77	6.54	1.5	5.75	0.87	8.51	1.06	5.93	0.94
mental verb	5.4	2.47	6.02	2.29	5.73	1.06	8.63	1.22	5.62	1.12
PP agent	6.9	1.84	6.42	1.7	5.77	0.9	8.56	1.15	5.96	0.95
intensifier	8.14	1.86	7.2	1.82	5.86	0.96	8.49	1.21	6.14	0.96
level	6.13	2.03	6.4	1.88	5.81	0.87	8.6	1.29	5.86	1
HRT	4.01	2.25	4.59	2.06	5.29	1.17	8.19	1.38	4.49	1.5
creak	5.67	2.01	6.14	1.92	5.59	0.96	8.49	1.16	5.68	1.04

forms, it is introduced by a preposition (see Chapter 2). Finite forms were found to be equivalent in strength to infinitival forms with a prepositional agent, both in the quantitative rating task and in the doctor role playing task. In fact, for the relevant life/ limb-threatening scenario, participants were almost equally split between using *it's important that you...* and *it's important for you to....* In the post-task questionnaire, participants explicitly indicated "specificity" and "personal" flavor as deciding factors in their judgments (along with a recommendation being "direct" and "firm"). Collectively, this evidence suggests that, at very least, the effect of clause type may interact with the effect of modal agent specification in contributing to MAE's imperative force. Sub-section 3.3.4 will further explore this issue with respect to the social interpretations of clause type and agent specification.

In contrast to **Hypothesis 1**, **Hypothesis 2** was clearly supported. **Hypothesis 2** postulated that MAE forms with personal agents would be rated as stronger in comparison to agent-less forms. As noted in Table 3.4, this effect was in the predicted direction: presence of a personal (i.e., hearer-oriented) modal agent was rated as stronger than absence

Table 3.4 Results from Tukey post-hoc comparisons for participants' STRENGTH ratings of survey items corresponding to perception task hypotheses, ordered with respect to Hypotheses 1-6. Interpretations should be read as "X is perceived as stronger than Y" for "X > Y" or, conversely, as "X is perceived as weaker than Y" for "X < Y", where X and Y represent generalized feature variants. '*' indicates statistical significance at the α=0.05 level.

pair-wise comparison	z value	p-value	strength interpretation
infinitival-finite	-5.834	< 0.001*	finite > infinitival
personal agent-no agent	-5.893	< 0.001*	personal agent > no agent
mental verb-action verb	-7.388	< 0.001*	action verb > mental verb
unmodified-intensified	-6.098	< 0.001*	intensified > unmodified
level-HRT	10.349	< 0.001*	level > HRT
level-creak	2.228	0.33450	level = creak

of a personal modal agent. Furthermore, it was of comparable magnitude to the effect of clause type (finite v. infinitival) variation (Z=-5.893, p<0.001). The life/ limb-threatening scenarios corroborated this effect and its respective direction, with *it's important for you...* and *it's important that you...* responses being selected over indirectly personal forms (e.g., *it's important for women...*) and agent-less forms. Again, this result is consonant with participants' post-task questionnaire responses, where individuals reported that they "chose the ones that were more personal to the person to show that the individual needed to follow the directions" and that "the more personal the suggestion the more the impact".

Hypothesis 3, suggesting that action verb forms would receive higher STRENGTH ratings than mental verb forms (see 12), was also supported by both the rating task and scenario data. MAE forms with action verbs were rated to be significantly stronger than mental verbs with the largest effect magnitude of all the structural form variants (Z=-7.388, p<0.001; see Table 3.4). Likewise, approximately eighty percent of respondents chose an action verb response (*It's important/ good to avoid salty foods*) over a mental verb response (*It's important/ good to consider avoiding salty foods*) in the high-urgency doctor role playing scenarios. Though only a few respondents commented on verb type in the post-task questionnaire, the

ones who did consistently framed action verbs as being stronger, more direct, and more appropriate for an MAE recommendation than mental verbs.

Analogously to (12), **Hypothesis 4** (predicting stronger ratings for intensified forms, see 13) was substantiated across all survey tasks. Intensification yielded a significant effect in the quantitative rating task, with intensified forms being rated as stronger than unmodified forms (Z=-6.098, p<0.001). Rather intuitively, the life/ limb-threatening scenario task showed that this effect may be graded based on the perceived strength of the intensifier, with *extremely* being selected more frequently than *very*. Regardless of this potential trend, however, intensifiers as a class were indisputably preferred over unmodified forms in the pertinent scenario questions. A handful of respondents emphasized the role of intensifiers in their post-task questionnaire comments by identifying "whether the word *extremely* was used" as a discriminating strategy.

With respect to the prosodic and sociophonetic features of (14)-(15), intonation, as operationalized in **Hypothesis 5**, performed distinctively among MAE features. **Hypothesis 5** proposed that HRT would be associated with lower STRENGTH ratings compared to level intonation, while **Hypothesis 6** predicted higher STRENGTH ratings for creaked versus non-creaked variants. In the rating task, the only judgment task in which intonation was assessed, pitch contour variation between declining (i.e., declarative) and high rising (HRT) had the largest effect size of all MAE features (Z=10.349, p<0.001), where HRT was seen as the weaker form (as predicted). The HRT item was one of the most commented-on items in the post-task questionnaire as well. Participants observed that HRT sounded exceedingly weak and "questioning", values that they found to be inappropriate for MAE as uttered by a physician.

The final feature examined in my perception study, utterance final creak (see 15), was not found to have an effect on MAE STRENGTH, counter to the prediction outlined in **Hypothesis 6**. As given in Table 3.4, the creaked and non-creaked declarative conditions garnered statistically equivalent strength ratings (Z=2.228, p=0.33). This lack of effect

was further evinced in the character trait rating items, where creak did not produce any significant effects. Additionally, none of the respondents commented on creak in the post-task questionnaire, despite reports in the literature and popular media demonstrating creak's status as a perceptually evaluable feature.[3] Thus creak does not appear to influence MAE's imperative force interpretation. As such, it will not be investigated or discussed in my production study.

3.3.4 Physician character perceptions

Having established the perceptual reality of the two pragmatic variants of MAE, strong and weak, the social meanings of MAE can be compared within and between the strong and weak classes of features to test **Hypothesis 7** and **Hypothesis 8**. In this section I consider how MAE's strong and weak features contribute to the perception of physician empathy (as measured by EMPATHY and OPEN-ENDEDNESS) to test **Hypothesis 7**, and of physician competence (as measured by CONFIDENCE and BEDSIDE MANNER) to test **Hypothesis 8**. As per **Hypothesis 7**, strong features are expected to garner lower EMPATHY ratings than weak features. Conversely, **Hypothesis 8** suggests that strong forms will receive higher CONFIDENCE ratings. The means and standard deviations for participants' ratings for all of these parameters are reported in their respective columns of Table 3.3.

Tables 3.5 and 3.6 collectively present the feature-level results pertaining to **Hypothesis 7** (see 16), which predicts that weak features will be perceived as more empathic than strong ones. In addition to the conceptional rationale given in Sub-section 3.2.2 for considering

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[3]It may be the case that creak is less overtly stigmatized than rising intonation. From this perspective, the finding that participants did not evaluate creak in terms of obligatory force modulation may be an awareness issue. This seems unlikely, however, given the abundance of public commentary on creak's social meaning (see Section 2.4). That being said, creak's relative salience (e.g., with respect to rising intonation) remains an open question, especially in medical contexts. Prior work demonstrates conflicting associations of creak with professionalism (Yuasa 2010) and untrustworthiness (Anderson et al. 2014), suggesting a high level of contextual dependency. It is possible that evaluations for creak in physicians' recommendations oppose one another (thus producing a null result on average) or that creak is not evaluated in this context at all.

Table 3.5 Results from Tukey post-hoc comparisons for participants' EMPATHY ratings of survey items corresponding to perception task hypotheses, ordered with respect to Hypotheses 1-6. '*' indicates statistical significance at the α=0.05 level.

pair-wise comparison	z value	p-value	empathy interpretation
infinitival-finite	-1.307	0.89673	finite = infinitival
personal agent-no agent	-1.742	0.65958	personal agent = no agent
mental verb-action verb	0.581	0.99910	action verb = mental verb
unmodified-intensified	0.145	1.00000	intensified = unmodified
level-HRT	3.340	0.01894*	level > HRT
level-creak	0.968	0.97885	level = creak

Table 3.6 Results from Tukey post-hoc comparisons for participants' OPEN-ENDEDNESS ratings of survey items corresponding to perception task hypotheses, ordered with respect to Hypotheses 1-6. '*' indicates statistical significance at the α=0.05 level.

pair-wise comparison	z value	p-value	openendedness interpretation
infinitival-finite	-1.268	0.91069	finite = infinitival
personal agent-no agent	-1.395	0.86005	personal agent = no agent
mental verb-action verb	-0.380	0.99995	action verb = mental verb
unmodified-intensified	-1.141	0.94778	intensified = unmodified
level-HRT	5.452	< 0.001*	level > HRT
level-creak	2.282	0.30314	level = creak

EMPATHY and OPEN-ENDEDNESS together, the results from Tables 3.5 and 3.6 further justify this choice. They show that participants evaluated EMPATHY and OPEN-ENDEDNESS in a comparable way across features. More specifically, HRT is the only feature that produced a significant difference in either rating (Z=3.34, p=0.02 for EMPATHY and Z=5.452, p<0.001 for STRENGTH). Thus **Hypothesis 7** is not corroborated, as it predicted that the entire class of weak features would have an effect on perceived physician empathy. None of the structural features came close to a significant effect. Furthermore, the effect that was observed for HRT went in the opposite direction from my prediction. HRT was associated with lower EMPATHY ratings as well as lower OPEN-ENDEDNESS ratings when compared to a declarative

contour. This is in diametric opposition to the statement in (16), a finding with two possible interpretations. One possibility is that rising intonational contours on MAE forms index a lack of empathy in particular. Another option is that HRT is negatively evaluated in a general sense when it is mapped onto physician-uttered MAE forms. My post-task questionnaire data tentatively supports the latter possibility, as illustrated by the representative quotes in (29).

(29) Direct quotes from participants (emphasis added):

    a. "I judged how strong something was by *the tone of the speakers voice* and how he or she presented the recommendation, *either with authority or through timidness.*"

    b. "her attitude and *tone of voice regarding her confidence level* of her statement."

    c. "*The conviction in their voice.* Some made it seem like a question at the end."

When mentioning "tone", "pitch", or "voice" quality, participants commented almost exclusively on attributes relating to physician competence or authority. This suggests, albeit indirectly, that when responding to questions targeting HRT's emotionality or solidarity value, participants were referencing a relatively generic reaction to the feature. In other words, for lack of a specific opinion on HRT's empathic effect, respondents appeared to be assessing HRT as globally inappropriate in MAE-style recommendations.

Table 3.7 Results from Tukey post-hoc comparisons for participants' CONFIDENCE ratings of survey items corresponding to perception task hypotheses, ordered with respect to Hypotheses 1-6. '*' indicates statistical significance at the α=0.05 level.

pair-wise comparison	z value	p-value	confidence interpretation
infinitival-finite	-2.908	0.07073	finite ≥ infinitival
personal agent-no agent	-0.216	1.00000	personal agent = no agent
mental verb-action verb	-2.927	0.06769	action verb ≥ mental verb
unmodified-intensified	-1.783	0.63170	intensified = unmodified
level-HRT	12.050	< 0.001*	level > HRT
level-creak	1.610	0.74461	level = creak

Table 3.8 Results from Tukey post-hoc comparisons for participants' BEDSIDE MANNER ratings of survey items corresponding to perception task hypotheses, ordered with respect to Hypotheses 1-6. '*' indicates statistical significance at the α=0.05 level.

pair-wise comparison	z value	p-value	bedside manner interpretation
infinitival-finite	-2.938	0.06550	finite ≥ infinitival
personal agent-no agent	-2.260	0.31606	personal agent = no agent
mental verb-action verb	-2.163	0.37450	action verb = mental verb
unmodified-intensified	-3.551	0.00897*	intensified > unmodified
level-HRT	9.750	< 0.001*	level > HRT
level-creak	1.388	0.86304	level = creak

Hypothesis 8 (see 17) predicts that strong MAE features will be associated with higher speaker-oriented competence ratings than weak features. Tables 3.7 and 3.8 report the results for CONFIDENCE and BEDSIDE MANNER respectively, both of which seem to draw upon notions of speaker competence. CONFIDENCE was a priori selected as this study's primary measure of competence (see Sub-section 3.2.2). Starting with this parameter, there is some evidence for the effect characterized in **Hypothesis 8**. All five strong features are rated higher in CONFIDENCE than their weak counterparts. Though only three features approach or attain significance at α=0.05, the overall trend is directionally consistent. The three features with the largest effects, intonation (Z=12.05, p<0.001), verb type (Z=-2.927, p=0.068), and complement type (Z=-2.908, p=0.07), may simply be the most salient of the group. BEDSIDE MANNER produced a very similar pattern. All of the strong features were associated with a qualitatively higher BEDSIDE MANNER rating, but only three reached or approximated the significance threshold. In the BEDSIDE MANNER case, intonation (Z=9.750, p<0.001), complement type (Z=-2.938, p=0.066), and intensification (Z=-3.551, p=0.001) carried the most statistical weight. Again, this re-weighting may reflect differential salience associated with the concepts of bedside manner and confidence, where these social meanings appear to be related but non-identical. Since the term "bedside manner" is a rather subjective, positive measure of physician performance, the analogous patterns observed across

CONFIDENCE and BEDSIDE MANNER may indicate that participants were evaluating "bedside manner" in terms of confidence/ competence. This is particularly likely given that my survey instrument implicitly associated BEDSIDE MANNER with trust, stipulating that a physician with excellent bedside manner would be worthy of a personal referral, where 'trust' is explicitly mentioned in one of the CONFIDENCE questions. Participants' post-task questionnaire responses to the 'strategies for judging bedside manner' question (see Appendix A) were consistent with this interpretation. They confirm that participants valued "being direct" and providing a "confident forceful approach" above other potential attributes. From this perspective, it stands to reason that HRT was associated with the lowest absolute CONFIDENCE and BEDSIDE MANNER ratings as well as the largest effect sizes when contrasted with declining intonation. Participants viewed this feature as a marker of uncertainty (see 29), where uncertainty in a physician's recommendation was socially evaluated as a negative trait indicative of incompetence and, potentially, untrustworthiness.

3.4 Summary

Chapter 3 detailed my rationale and methodology for studying MAE perception along with the results from my perception experiment. The goal of eliciting judgments on the pragmatic and social value of MAE in physician-patient interaction was to provide a means by which to interpret physicians' production of this variable. I have argued for a compositional, feature-based approach to the MAE variable, one that contrasts MAE forms in terms of weak and strong imperative force. In order to account for the diverse number of potential MAE feature combinations under this framework, each composite feature had to be valued as either strong or weak.

I designed a multi-part judgment survey for the dual purposes of a.) assigning dichotomous, 'strong' and 'weak' force labels to individual MAE features and b.) characterizing some of the possible social meanings of 'strong' and 'weak' in physician speech. I fielded my survey to a middle-aged sample of native English speakers with the intent of repre-

senting the social distribution of my production sample and of outpatient medicine more generally. These participants engaged in a several scenario-based and rating-style judgment tasks. These tasks collectively targeted a hypothesis-driven set of MAE features and feature contrasts. In addition to providing their MAE judgments, these participants also offered qualitative feedback on the motivations behind their judgments.

The results of my judgment survey indicated that variation in MAE complement structure, verb type, agent type, modification, and intonation impacted participants' pragmatic interpretation of a given MAE form. Table 3.9 summarizes the assignment of feature variants into weak and strong classes based on these results.

Table 3.9 Summary of variants and values for the five MAE features found to impact imperative force interpretation.

MAE feature	Variant	Perceived imperative force
COMPLEMENT	infinitival	weak
	finite	strong
AGENT	non-personal	weak
	personal	strong
VERB TYPE	mental	weak
	action	strong
INTENSIFICATION	unmodified	weak
	intensified	strong
INTONATION	rising	weak
	declarative	strong

Weak and strong MAE variants were found to have internally consistent social interpretations. Strong variants were associated with perceptions of physician competence, confidence, and trustworthiness. Weak variants, conversely, indicated relative incompetence, uncertainty, and untrustworthiness. These indexical relationships will form the basis for translating intra-construction, inter-speaker variation in MAE production into contextually situated, stylistically meaningful sociolinguistic practice.

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Chapter 4

MAE production: structure

In order to determine how physicians use MAE as a sociolinguistic resource in providing medical recommendations, I generated a sample of naturally occurring MAE tokens from physician-patient interaction and modeled the distribution of strong/ weak structural forms as defined in Chapter 3. Focusing here on syntactic and semantic features in MAE production, I provide further evidence in support of the strong/ weak distinction by establishing that the feature classes identified in Chapter 3 exhibit class-internal co-variation across speakers. I also begin to explore MAE variation as a social and stylistic phenomenon by investigating social and medical conditioning factors on MAE use. In doing so, I apply the character trait perception findings from Chapter 3 to reframe social correlations in terms of physician identity work.

4.1 Objectives and hypotheses

As suggested above, the main objective of my structurally-focused production experiment is to further the concept of a pragmatic variable. Chapter 3 outlined four variable, syntactic/ semantic features of MAE: complement type, verb type, modal agent type, and the presence/ absence of intensification, and showed that each of these features had pragmatically strong and weak realizations. It could not demonstrate, however, that these features co-vary in such a way as to suggest that imperative force is a bonafide, functionally construed sociolinguistic variable. As Tagliamonte (2006:76) puts forth, the proof of a variable's validity is "in the pudding". That is to say, a true sociolinguistic variable is a feature or system of features that is associated with sociolinguistically conditioned alternation in natural speech. By studying co-variation in the four structural features of MAE, I aim to test whether or not imperative

force qualifies as a sociolinguistic variable under which 'strong' and 'weak' constitute variant classes. As a secondary objective, I will investigate the social conditions associated with 'strong' and 'weak' MAE use. The stylistic implications of these social findings will be raised here, but further investigated in the second half of my production study (see Chapter 5).

4.1.1 Hypotheses for structural correlations

The subsequent hypotheses describe prospective correlations between MAE's strong and weak variants along with potential relationships between MAE feature strength and a variety of social factors. Their form reflects the fact that multiple logistic regression is the primary analytic method used in my production study. Each hypothesis is presented along with rationale/ supporting evidence and assigned a unique number continuing from the count started in Chapter 3.

4.1.1.1 Co-variation hypotheses

(30) a. **Hypothesis 9**: Strong MAE features (finite complements, action verbs, intensifiers, and personal modal agents) will co-vary (i.e., correlate) with one another in physician speech

   b. **Hypothesis 10**: Weak MAE features (infinitival complements, mental verbs, and non-personal/ inexplicit modal agents) will co-vary with one another in physician speech

The hypotheses given in (30) formalize the notion that strong and weak features will behave as coherent variant classes not just in perception but also in production. In a practical sense, co-variation will be established via correlation. Strong features will be expected to predict other strong features in regression analyses, while weak features correspondingly predict other weak features. Counter-evidence against (30) would be observed in the form of strong feature variants predicting weak feature variants or vice versa. Such a result would point to a

lack of cohesion with respect to strong and weak feature production, where (30) hypothesizes that these feature groupings will behave as uniform sets. As suggested above and reinforced below, these hypotheses are central to the argumentation of this dissertation. They form the basis of my intra-construction characterization of style, establishing that pragmatic co-variation occurs within MAE forms. Furthermore, they form the foundation upon which my socially framed predictions are built.

4.1.1.2 Social hypotheses

Hypotheses 11-17 propose social constraints on physicians' MAE use assuming that the co-variation hypotheses given in (30) are supported in the data.

(31)   **Hypothesis 11**: Increasing proportions of strong MAE features in physician speech will correlate with increasing physician years in practice

(31) posits a relationship between MAE strength and physician experience. More specifically, it suggests that physicians' increasing occupational age (measured as years practicing medicine post-residency) will be a significant conditioning factor for strong MAE forms. This hypothesis is based on the idea that physicians are socialized into the goals and norms of medical practice, adapting their language in response to institutional pressures. Sounding firm, confident, and/ or trustworthy may be one such pressure, as these characteristics may play a role in encouraging patients to adhere to their prescribed treatment regimens. Subsection 3.3.4 gave evidence for an association between strong MAE forms and perceptions of confidence and trustworthiness in physician speech. Moreover, Lee and Lin (2009) reported that perceptions of physician trust were significantly related to patient recommendation adherence in a sample of diabetic patients. Assuming that these findings are generalizable, more experienced physicians, those with years of practice in encouraging patients to adhere to recommendations, may sub-consciously tend towards the use of strong, trust-engendering linguistic features. For this reason, (31) predicts that proportionally more strong MAEs will be used by relatively experienced physicians.

(32) **Hypothesis 12**: Greater proportions of strong MAE features in physician speech will be associated with male physicians than with female physicians

The hypothesis in (32) references work on gendered differences in physician speech, where female physicians are generally found to be less direct than their male counterparts. For example, West's (1990) qualitative study of directives in physician-patient speech indicated that female physicians used more mitigated directive forms than male physicians. Similarly, Hasty et al. (2012) found that female physicians were more likely to use hedge-like, indirect double modal forms than male physicians. The qualitative findings in Sub-Section (3.3.3) suggest that strong MAE forms are valued for being "firm", "forceful", and "to the point", descriptors that are relatively compatible with the literature's characterization of male physician speech. Thus (32) predicts that physician gender will have a conditioning effect on MAE variation.

(33) **Hypothesis 13**: Greater proportions of strong MAE features in physician speech will be associated with specialized physicians in comparison to general practice (i.e., family medicine) physicians

(33) operationalizes the intuition that medical specialties represent distinct sub-cultures of medical practice. They have different interactional goals, trained behaviors, and relational ideals that are subject to evaluation both within the medical community and outside of it. Paasche-Orlow and Roter (2003) demonstrated that these dissimilarities can lead to characteristic communicative practices within specialties. They showed that a sample of consultations from internal medicine physicians differed significantly from a sample of family medicine visits in terms of physicians' use of certain conversational behaviors. Using a standard rating scale, they observed more psychosocially-oriented talk in the family medicine sample. Said talk was exemplified by the use of 'empathy' and 'reassurance' exchanges. Though these behaviorally-defined exchanges cannot be directly translated into discrete, linguistic constructions and/ or acts, one possible interpretation of Paasche-Orlow and Roter's fingings is that family medicine physicians may be more sensitive to patient face needs than

specialists. To the extent that weak MAE forms serve as a type of hedge, it is plausible that said forms would be proportionally more common in family medicine physicians' speech than in specialist physicians' speech. (33) presents this specialty-based hypothesis, focusing on the previously documented contrast between family medicine physicians and other specialties.

(34) **Hypothesis 14**: Increasing proportions of strong MAE features in physician speech will correlate with increasing severity of patients' medical conditions

In analogy to (33), different patient types may impact MAE use in a similar fashion to physician types. Patients are associated with distinctive clinical and interactional needs based on their primary diagnoses, co-morbidities[1], coping styles, etc. Modeling physicians' MAE use with respect to all of these variables, however, would be both methodologically undesirable and conceptually imprecise. (34) collapses clinically relevant patient variability into a single summary measure: physician-assessed patient severity; that is, the physician's professional opinion regarding the severity of the patient's disease or condition. Severity acts as a holistic measure of a patient's need for biomedical intervention in the form of a medication, procedure, etc. It may also indicate the risk of said patient experiencing an undesirable health outcome. It is reportable for all chronic conditions and incorporates the subjective element of physician perception, where physician perception is likely to influence physicians' MAE production. (34) hypothesizes that more strong MAE constructions will be used with subjectively high-risk patients than with comparatively stable patients. This prediction reflects the perception experiment results from Chapter 3 in that participants associated strong MAE forms with more effective recommendation provision and favored them in scenarios that invoked biomedical necessity/ urgency.

(35) **Hypothesis 15**: Greater proportions of strong MAE features in physician speech will be directed at male patients than at female patients

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[1]Co-morbidities are health conditions other than a patient's primary diagnosis that may impact his/ her care or outcome. For example, obesity is a common co-morbidity with heart disease.

It is also possible that patient demographics will impact physicians' selection of MAE forms. Using a distinct but conceptually similar measure to the rating system employed by Paasche-Orlow and Roter (2003), Bertakis et al. (2009) found that female patients received more patient-centered communication than male patients. Patient-centered communication was defined as talk that dealt with patient concerns and values, prioritizing patients' psychosocial context. Again, this definition does not lend itself to the identification of specific linguistic features. Under the assumptions given in the discussion of (33), however, one might interpret this finding such that comparatively indirect, weak MAE forms would be associated with female patients. For lack of more direct evidence to the contrary, (35) hypothesizes that female patients will receive a disproportionate number of weak MAE forms.

(36) **Hypothesis 16**: Greater proportions of strong MAE features in physician speech will be addressed to unemployed patients than to employed or retired patients

Willems et al's (2005) meta-analysis of physician-patient communication studies reported that patients from lower socio-economic classes received more directive communication. They cast 'directive' communication in opposition to patient-centered and/ or shared communication patterns, once more referring to behaviorally defined styles rather than actual directives or directive sub-forms in a linguistic sense. Nonetheless, following the reasoning of the previous hypotheses, this meta-analysis offers some support for the prediction stated in (36), which specifies employment status as an indicator of socio-economic status based on the meta-data available for the current study (see Sub-Section 4.2.1 for an overview of the meta-data used in this analysis). Though 'socio-economic class' definitions vary from study to study in Willems et al's summary, it should not be assumed that (36) fully represents a relationship between MAE form and socio-economic status, as the latter is known to be a multi-factorial, locally situated construct. The hypothesis in (36) narrowly predicts that unemployed patients, who may be socio-economically disadvantaged, will receive a greater proportion of relatively directive, strong MAE forms than employed or retired patients.

(37)　**Hypothesis 17**: Higher proportions of strong MAE features in physician speech will be used with non-white patients than with white patients

(37) also derives from medical literature, drawing on reports of ethnicity-based differences in physician-patient communication (Ashton et al. 2003; Cooper et al. 2003; a.o.). In particular, Street et al. 2007 found that African American patients received proportionally more 'contentious' communication when compared to white and Hispanic patients. 'Contentiousness' emerged from a factor analysis of results from a Likert-style rating instrument targeting physician affect. It was composed of 'dominant' and 'angry' sub-factors. Though choice of MAE form was not significantly correlated with emotional measures in the current study (see Chapter 3), the directive, confident associations reported for strong MAE forms could be construed as 'dominant'. With this potential relationship in mind, (37) suggests that physicians will produce significantly more strong MAE forms with non-white patients than with white patients.

The next Section details the methods by which I tested (30)-(37). In similar form to Chapter 3, I will address the hypotheses formulated in the current Section in the Methodology (4.2) and Results (4.3) Sections to follow.

4.2　Methodology

For the purpose of assessing the social and linguistic constraints on physicians' MAE use, I mined a large database of recorded physician-patient interactions and analyzed the resulting MAE tokens using standard variationist methods. Sub-section 4.2.1 provides additional detail on the corpus, sample, and token extraction process. It defines and describes several medically relevant sub-samples. Sub-section 4.2.2 describes my coding categories as well as my general approach to statistical modeling and reporting. It associates (30)-(37) with operationalized, measurable factors whose observed relations will be the subject of the subsequent Results Section (4.3).

4.2.1 Corpus data and sample selection

The Verilogue corpus of healthcare provider-patient dialogue (Kozloff & Barnett 2006), a collection of approximately 90,000 audio-recorded office visits, provided the medical production data for this study. It is maintained by Verilogue Inc. and primarily used for healthcare market research. Physicians practicing in a variety of specialties are paid to submit interactions with unpaid, consenting patients for terms of approximately one year. Individual patients are only recorded once, but physicians are recorded multiple times over the course of their participation. In addition to their recordings, physicians provide metadata on their specialty, gender[2], and years in practice as well as a basic assessment of the patients' health, including their presenting complaints, co-morbidities, disease severity, etc. Patient gender, age, ethnicity, employment status, and insurance type are also collected as metadata. Though this study focuses on recordings from physicians practicing in the United States, Verilogue has collected data from multiple countries, making it the largest and most diverse corpus of medical interactions in the world.

Physician-spoken tokens of the *importance*-type MAE forms outlined by Van linden and Verstraete.[3](2010) were extracted from Verilogue via an automated process. This resulted in a sample of 3,051 raw (i.e., unconfirmed) tokens, of which the overwhelming majority (N=2,957, 97%) were *it's important to/ that...*. Given the skew in the data toward *important*, and the desire to carefully circumscribe the MAE variable context without introducing lexical contrasts, I limited my quantitative analysis to tokens of *it's important to/ that*. For the remainder of this Section, where other adjective forms are being discussed, I refer to MAE

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[2]Use of the term 'gender' as opposed to 'sex' in my production study reflects the fact that physicians are specifically asked to report their 'gender' and that of their patients. Given that they are only provided with 'male' and 'female' options, their responses are most likely representations of biological sex rather than socially constructed gender roles. Nonetheless, 'gender' is used here in order to maintain consistency with the Verilogue corpus.

[3]The *importance*-type MAE forms include: *it is important to/ that...*, *it is essential to/ that...*, *it is critical to/ that...*, *it is crucial to/ that...*, *it is necessary to/ that...*, *it is needful to/ that...*, *it is indispensable to/ that...*, and *it is vital to/ that...* See Chapter 2 for a discussion of the different types of MAE forms identified in the literature.

forms featuring *important* as MAE*imp* for clarity.

After discards and exclusions, 1,857 MAE*imp* tokens were retained for analysis from the 2,957 automatically extracted potential tokens. The most common reason for discarding a token was that it did not actually conform to the MAE structure given in Chapter 2. Attributive tokens (e.g., *it's an important drug*) and predicative tokens (e.g., *that test is important*) constituted the bulk of these non-MAE discards. Forms that were structurally ambiguous were also removed.[4] Verified MAE*imp* tokens that were rendered incomplete by restarts, interruptions, etc. were excluded if they could not be coded for all of my linguistic factors. The post-exclusion, final token count for MAE*imp* is displayed alongside counts for the other *importance*-type MAE adjectives in Figure 4.1.

My analysis of MAE*imp* encompassed all 1,857 verified tokens. I will refer to this complete sample as the OUTPATIENT MEDICINE sample, collapsing the various specialties, conditions, and practice settings represented in non-hospital based medical practice. Within the OUTPATIENT MEDICINE sample, I analyzed physicians' use of MAE*imp* in four different sub-samples of the data (see Table 4.1): PEDIATRICS, DIABETES (specifically Type II Diabetes), OSTEOPOROSIS, and CORONARY ARTERY DISEASE (CAD). These four sub-samples collectively encompass 656 of the 1,857 total tokens as sub-sets of OUTPATIENT MEDICINE. Over 100 tokens of MAE*mp* were present in each sub-sample, which I deemed adequate for quantitative analysis.

The PEDIATRICS sub-sample was created to test for specialty-specific constraints on MAE*imp* use, while the DIABETES, OSTEOPOROSIS, and CORONARY ARTERY DISEASE sub-

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[4]Ambiguous tokens were potentially predicative or extraposed uses of *it's important*. Consider the constructed example in (1).

(1)   You should be on Vitamin D. It's important to help your bones mineralize.

The *it* in (1) could be either referential or expletive. In the referential reading, *it* refers to *Vitamin D* and the sentence conveys the importance of Vitamin D in bone mineralization. If *it* is understood in the expletive sense, the sentence is a general recommendation to attend to bone mineralization. Such cases were relatively rare in MAE*imp*, but they may be more common with other mandative adjectives such as *good* or *necessary*.
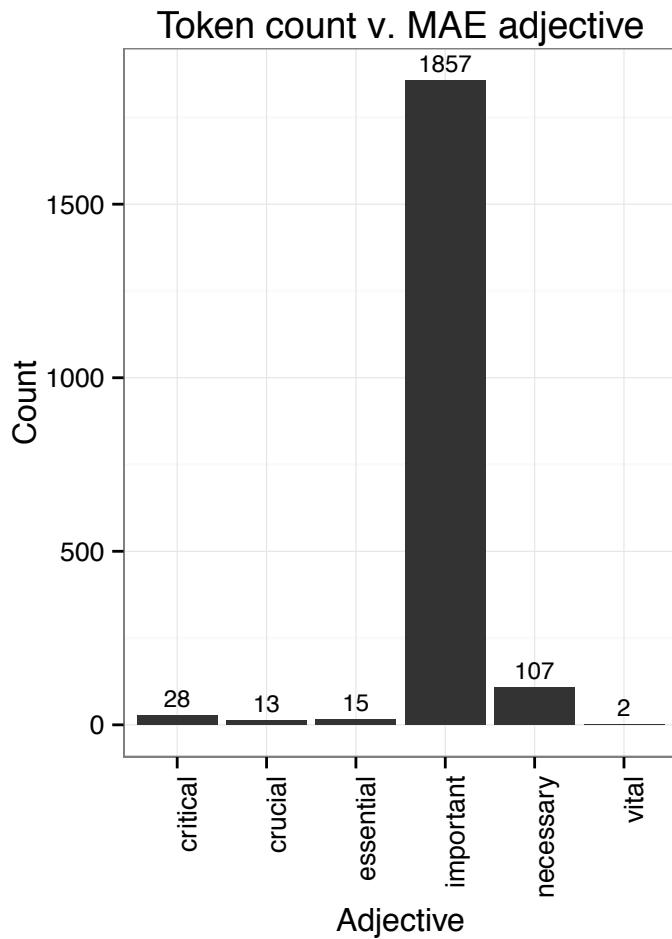
Figure 4.1 Counts of confirmed tokens for all *importance*-type MAEs.

samples were intended to collectively address the possibility of distinct patterns within particular conditions. PEDIATRICS is a specialized kind of outpatient practice involving the diagnosis and management of medical conditions impacting infants, children, and young adults. Despite the fact that Pediatricians practice within the larger institution of outpatient medicine, one might expect the social specificities of their specialty (e.g., the triadic nature of their conversations[5], their primary care orientation, etc.) to impact their use of MAE*imp.* In contradistinction to PEDIATRICS, a specialty-defined sub-sample, DIABETES,

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[5]Unlike the visits of most physicians specializing in adult medicine, Pediatrician visits routinely consist of three or more participants: the physician, the patient, and a parent or caregiver.

OSTEOPOROSIS and CORONARY ARTERY DISEASE are medical condition-based sub-samples. Physicians treating a particular medical condition might be expected to share a very particular set of interactional goals. For example, in treating diabetic patients, physicians may collectively orient to the tasks of motivating patients to make lifestyle changes or to adhere to complex medication schedules. These goals may be associated with distinctive communicative behaviors and/ or linguistic strategies. Thus, in the context of condition-based sub-samples, it is possible that physicians may exhibit interlocutor effects with respect to their MAE*imp* use, varying their production of MAE*imp* features in accordance with the macro-pragmatic constraints present in a given disease state. Diabetes, osteoporosis, and coronary artery disease were selected as the only individual disease states with greater than 100 confirmed tokens of MAE*imp*. They all happen to be chronic diseases with high overall prevalences in the US, making them epidemiologically comparable as well.

Table 4.1 Token counts by sub-sample for MAE*imp* production data.

Sample	N_{tokens}
Overall outpatient medicine sample	1857
Pediatric sub-sample	230
Diabetes sub-sample	156
Osteoporosis sub-sample	113
Coronary artery disease (CAD) sub-sample	157

4.2.2 Multiple regression modeling

For the purposes of regression analysis, all 1,857 tokens were coded for four linguistic variables and seven social independent variables. These variables were selected as measures by which to test the hypotheses stated in (30)-(37).

The following linguistic factors, collectively pertaining to **Hypothesis 9** and **Hypothesis 10**, were coded: COMPLEMENT, INTENSIFICATION, complement VERB TYPE, and in-

tended MODAL AGENT.[6] Three of these four factors—COMPLEMENT, INTENSIFICATION[7] and intended MODAL AGENT—served as dependent variables in my analysis. By considering each of these features as separate variable processes within MAE*imp*, I intended to assess the relative weight of variant class correlations on a feature-by-feature basis, thereby testing my co-variation hypotheses (30) from several angles. VERB TYPE was excluded from this process because mental and action verb complements are not functionally equivalent. The use of a mental verb as opposed to an action verb changes the truth evaluable meaning of a sentence, expressing a completely different thought. Thus VERB TYPE was retained as an predictor of MAE*imp* form, but not as a dependent variable.

The seven social factors, corresponding to the hypotheses given in (31)-(37), were drawn from physician/ patient demographic characteristics and health-related variables. For the physician, I included his/ her GENDER, number of YEARS-IN-PRACTICE, and medical SPE-CIALTY. For the patient, I factored in his/ her GENDER, ETHNICITY, and EMPLOYMENT STATUS as well as the SEVERITY of his/ her condition (all of which were assessed and reported by the physician). Recall that the Verilogue database does not provide information

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[6]The determination of 'personal' versus 'non-personal' MODAL AGENT was limited to subjects of MAE*imp* complements and potential agents introduced via *to-* or *for-* headed prepositional/ noun phrases. In order to be considered 'personal', the patient had to be explicitly included as a possible agent in one of these two ways. For example, a personal MODAL AGENT given by the subject of an MAE*imp* complement could be realized as *it's important that you...* or *it's important that we...*. Similarly, a personal MODAL AGENT introduced by a prepositional/ noun phrase could be given as *it's important for you to...*, *it's important for patients like you to...*, etc. Non-personal MODAL AGENTS were either inexplicit, null cases or cases that explicitly excluded the patient from reference. Examples of the latter form referred to the physician, a third party, a concept, or an inanimate object (e.g., your kidneys). Importantly, possessive pronouns suggestive of an intended MODAL AGENT (e.g., your diabetes) were not considered to be sufficient evidence for 'personal' status. This determination was based on examples of the following form: *it's important that I track your diabetes*, which include second person or first person plural possessive pronouns along with unambiguously non-personal subjects.

[7]Though Table 4.2 includes downtoned forms along with unmodified forms as a collectivized non-intensified variant, downtoners were exceedingly rare in the data. A downtoned example is given in Table 4.2 for the sake of completeness, but the vast majority of non-intensified forms were unmodified (e.g., *it's ∅ important to take your pills*).

about physician ethnicity. Furthermore, physician SPECIALTY and patient EMPLOYMENT STATUS could only be considered in the overall outpatient medicine sample, while physician GENDER and patient GENDER/ ETHNICITY were excluded from the CAD and Osteoporosis samples respectively due to unbalanced distributions. Within the diabetes sample, I also incorporated HbA1C as a condition-specific measure of SEVERITY, where higher HbA1C values indicate increasing severity.[8] Tables 4.2 and 4.3 summarize my linguistic and social factors respectively, explicating their levels where appropriate.

Table 4.2 Linguistic factors coded in the structural production sample.

MAE feature	Variants	Illustrative examples
COMPLEMENT	Infinitival	*it's important to take your pills*
	Finite	*it's important that you take your pills*
INTENSIFICATION	Intensified	*it's very important to...*
	Non-intensified/ downtoned	*it's kinda important to...*
VERB TYPE	Mental verb	*it's important to know/ understand...*
	Action verb/ other	*it's important to do/ take...*
MODAL AGENT	Personal	*it's important for you to...* *it's important that you...*
	Non-personal	*it's important to...* *it's important that your liver...*

I performed several multiple logistic regression analyses on the distribution of MAE*imp* forms across my various dependent variables and sub-samples. Multiple models were required to test a single hypothesis in certain sub-samples. It was necessary, for example, to create two separate models for the pediatric sample. In this case, linguistic and social factors were considered separately to allow for an adequate distribution of tokens across all cells (Tagliamonte 2006). As mentioned above, despite efforts to condense or otherwise recode categories, some independent variables could not be included in individual models due to

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[8]HbA1C is a measure of long-term diabetic control. It measures the amount of hemoglobin that is glycosylated within a sample of human blood. Glycosylation occurs when blood glucose levels are abnormally high (i.e., when a diabetic patient has poorly controlled blood glucose). Clinically, HbA1C is used as a quantitative proxy for disease severity in diabetic patients, where higher values indicate more severe disease.

Table 4.3 Social factors coded in the structural production sample.

Social factor	Levels
PHYSICIAN GENDER	male, female
PHYSICIAN YEARS IN PRACTICE	continuous years
PHYSICIAN SPECIALTY	Rheumatologist, Oncologist, other internal medicine sub-specialty (Cardiologists, Endocrinologists, and Gastroenterologists), Neurologist, OB/GYN, Pediatrician, Psychiatrist, Primary Care Physician, Other
PATIENT GENDER	male, female
PATIENT ETHNICITY	black, white, Hispanic, other [collapsed to Non-white and White in smaller sub-samples]
PATIENT EMPLOYMENT STATUS	part-time, full-time, unemployed, retired, student, not applicable
DISEASE SEVERITY	mild, moderate, severe [for samples other than diabetes]
	continuous HbA1C [diabetes sub-sample only]

their distribution in the data and/ or their interactional effects. Most notably, physician GENDER could not be considered in the CAD sample due to the extremely low proportion of female Cardiologists in the Verilogue data.

My multiple logistic regression models were generated using Rbrul (Johnson 2009) in R (R Core Development Team), utilizing mixed effects techniques to consider the influence of individual speakers where possible.[9] For each multi-variate analysis table in the Results section to follow, the title indicates the dependent variable with the application value[10] (i.e., variant being predicted) listed first. The table itself displays only those factors retained in the output of the Rbrul analysis as significantly predicting the distribution of the dependent

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[9]For the outpatient medicine sample, the token/speaker ratio was exceedingly low. When mixed effects modeling was attempted on this sample, Rbrul returned an error message. To ensure the validity of my fixed effects findings for this model, I re-ran the model using R's glmer package. This run completed successfully and confirmed that all of the fixed effect results identified in Rbrul retained significance with the introduction of random intercepts by speaker.

[10]The proportion of the variant being predicted (i.e., application value) out of the total occurrences of the variable (i.e., the total number of tokens in the sample being analyzed) is reported as the 'Grand mean' in each results table.

variable. Unless specifically noted here or in the discussion pertaining to a particular table, all linguistic and social variables were considered in the modeling process. Results are given in terms of log odds and centered factor weights (abbreviated FW).

4.3   Results

The results of my logistic regression analyses of structural MAE*imp* features (COMPLEMENT, INTENSIFICATION, MODAL AGENT) are provided in the following Sub-sections.They are organized in terms of the dependent variable under analysis as well as the sample being used. Sub-section 4.3.1 describes my findings for COMPLEMENT with respect to all five samples. Sub-sections 4.3.2 and 4.3.3 present results for select samples. The rationale for focusing on particular samples is given in each of these two Sub-sections. Seeing that the remainder of this dissertation focuses on MAE*imp*, I henceforward refer to the 1,857 *important* tokens in my analysis simply as MAE, and utilize the MAE*imp* label only where it is necessary for clarity.

4.3.1   COMPLEMENT variation

COMPLEMENT alternation between finite (i.e., *it's important that...*) and infinitival (*it's important to...*) MAE represents the first of three dependent variables considered in my analysis. Based on the perception results reported in Sub-section 3.3.3, the finite form conveys a significantly greater degree of imperative force than the infinitival form. In other words, the finite form is a potential member of the strong MAE variant class in production as well as perception, as hypothesized in (30a). The finite form will serve as the application value for all of the regression analyses in this Sub-section. Its predictors are expected to be other strong features (i.e., personal agents, intensifiers, and non-mental verbs) and social characteristics associated with giving or receiving a strong MAE form.

4.3.1.1 Outpatient sample

Use of the finite MAE form in the Outpatient sample was modeled by four predictors (see Table 4.4). The finite-complement, *important that* variant is favored by speakers in co-occurrence with personal intended MODAL AGENT, intensifier presence, and non-mental VERB TYPE. It is also positively correlated with physician YEARS IN PRACTICE.

Table 4.4 Significant predictors of physicians' use of the finite form of COMPLEMENT in the entire outpatient medicine MAE sample.

Finite v. infinitival complement			
grand mean 'finite'	0.33		
df	5		
total N	1857		
deviance	1438.13		
	FW	**log odds**	**% finite**	**N**
Intended agent		p<0.01	
personal	0.851	1.745	0.701	772
non-personal	0.149	-1.745	0.066	1085
range	70.2		
Intensification		p=0.01	
intensified	0.543	0.174	0.384	742
non-intensified	0.457	-0.174	0.294	1115
range	8.6		
Verb type		p<0.01	
other	0.624	0.508	0.354	1631
mental verb	0.376	-0.508	0.159	226
range	24.8		
Years in practice		p=0.02	
increasing	0.02		

The association between personal intended MODAL AGENT and finite COMPLEMENT is consonant with **Hypothesis 9**: both finite COMPLEMENT and personal MODAL AGENT are strong features and they appear to co-vary. A similar observation can be made for the

INTENSIFICATION finding. Intensified forms are stronger, as per the perception experiment in Chapter 3, and thus resonant with finite complement type, the strong COMPLEMENT variant.

The VERB TYPE result, in distinction from the other two linguistic factors, can be interpreted with reference to both **Hypothesis 9** and the MAE literature. First, with respect to **Hypothesis 9**, the correlation between strong, non-mental VERB TYPE and strong, finite COMPLEMENT provides further support for the prediction that strong forms co-vary. Second, with regard to the literature, Van linden and Davidse's (2009) study of diachronic MAE variation claimed that evaluative, finite *important*-type MAE uses developed diachronically from mandative, infinitival ones (see Chapter 2 and Section 3.1.1 for additional discussion). In this progression, mental verbs acted as a bridging context, promoting the spread of evaluative uses to new predicates. Thus, although the current study uses synchronic data, the results superficially corroborate Van linden's analysis: the majority of mental verbs occur with infinitival forms, suggesting a predominance of bridging contexts. These contexts may have facilitated growth of the finite variant, which constituted nearly a third of the tokens in my data.

Moving to the significant social predictor of COMPLEMENT variation in the outpatient medicine sample, increasing use of the strong, finite COMPLEMENT variant with increasing YEARS IN PRACTICE corroborates **Hypothesis 11**, which is based on the concept of professional socialization. Physicians who have practiced medicine longer may be socialized into using the strong form, either through accumulated patient care experience or through extended immersion in the ideologies of clinical medicine. Focusing first on the former source of acculturation, physicians may learn over time that patients associate strong, finite forms with physician confidence and/ or trustworthiness (see the results form Section 3.3.4). They may also observe an increased likelihood of patients adhering to their prescribed treatments with the adoption of a firm, confident interactional persona, as suggested by Lee and Lin's (2009) findings. As for the latter possibility, regarding ideology, there is some evidence that

physicians become more direct as they gain experience due to the ambient professional culture of medicine, where this shift towards directness may promote the use of strong forms. This link depends on the assumption that directness is somehow less patient-centered, which (though implicit in the literature) has not been directly tested. Nonetheless, several studies have found that physicians become less patient-centered as they mature (Bombeke et al. 2011; Tsimsiou et al. 2007; Hojat et al. 2009). To the extent that patient centeredness is related to polite indirectness, a decrease in weak form use may be one way in which physicians solidify a biomedically-oriented approach, one that focuses on the needs and goals of the medical professional (e.g., ensuring treatment adherence) rather than those of the patient.

Of course, since the medical production data is cross-sectional, there is a possibility that increasing YEARS IN PRACTICE may actually be confounded with real-time. That is to say, rather than physicians using more strong MAE forms as they mature professionally, it may actually be the case that succeeding generations of new physicians are using fewer strong MAE forms, perhaps as a result of slight changes in medical attitudes or education over time. To check this competing hypothesis, I re-ran the model in Table 4.4 with the addition of INTERACTION ID as a continuous factor. INTERACTION ID catalogues the order in which transcripts are added to the Verilogue corpus. As such, it serves as a proxy for chronological time. If significant, it would suggest that the YEARS IN PRACTICE finding could actually be masking a community change. This factor was not selected as significant, providing evidence in favor of the interpretation that physicians' increased use of finite forms over their YEARS IN PRACTICE represents a professionally contextualized age grading process. A more apt term may be "experience-grading", thus capturing the apparent finding that physicians' sociolinguistic behavior is being shaped (in part) by their time interacting with

patients or absorbing the professional culture of medicine.[11]

Overall, the implications of my quantitative modeling as applied to the outpatient medicine sample can be summarized with three observations: 1) the strong variants of MAE features tend to co-occur as predicted in **Hypothesis 9**, 2) physician MAE use in medical consultations is conditioned by the linguistic factor previously reported to impact MAE use in non-medical data (i.e., VERB TYPE), and 3) physicians may be socialized into using relatively strong MAE forms over time. The subsequent Sub-sections will discuss the extent to which these observations hold within medically meaningful sub-groups based on physician specialty and patient condition.

4.3.1.2 Pediatrics sample

As noted above, I generated independent models for linguistic factors and for social factors conditioning COMPLEMENT in Pediatrician speech. Recall that these separate models were necessary to maintain adequate cell sizes for quantitative analysis, especially in the case of poorly distributed linguistic factors. The linguistic model included three fixed-effect factors: intended MODAL AGENT, VERB TYPE, and INTENSIFICATION, where the first two factors were retained as significant (see Table 4.5). Both of these factors conditioned finite COMPLEMENT in the expected direction. Namely, as predicted in **Hypothesis 9**, personal MODAL AGENT and non-mental VERB TYPE were associated with finite COMPLEMENT forms.

Though both of the linguistic factors retained for the pediatric sub-sample were significant in the larger outpatient medicine sample, one constraint is notably missing from Table 4.5: INTENSIFICATION. A comparison of the distributions of intensified forms across COMPLEMENT types still trends in the expected direction, with more intensifiers associating with

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[11]INTERACTION ID cannot help disambiguate experience grading from an additional possibility: a professional shift. In other words, it is possible that a dramatic change in medical teaching or practice could have occurred within these physicians' professional lifetimes, but before the onset of data collection. This would give the impression that physicians change over their respective lifetimes when, in fact, the change is limited to a single generation. Though possible, this scenario is unlikely given the diversity of educational backgrounds and formative experiences represented in Verilogue's nationwide sample.

finite forms than with infinitival forms, but the difference is not significant: χ^2 (1, N = 230)= 1.59, p = 0.21. The fact that INTENSIFICATION was retained as significant for the overall sample but not for pediatrics points to distinct preferences for imperative force modulation between specialties. It may be the case for example, that Pediatricians do not collocate intensifiers on finite complement MAEs because the product is overly forceful. As discussed in Chapter 2, overly forceful modal forms may be face-threatening, especially in asymmetric interactions. Pediatricians may be exceptionally sensitive to the power imbalance in their interactions given that they work with children and adolescents. They may also be cognizant of competing parental authority in the visit (Aronsson & Rundström 1989). Another potential explanation for INTENSIFICATION's lack of predictive value in the pediatric sub-sample may be that Pediatricians are using other features such as emphatic prosody, intra-complement argument structure, etc. to strengthen their finite complement MAEs. Whatever their underlying motivations may be, Pediatricians seem to be utilizing VERB TYPE and intended MODAL AGENT as their primary linguistic co-variants for finite-complement MAEs.

In the social model for Pediatrician MAE, physician GENDER and YEARS IN PRACTICE were selected as significant (see Table 4.6), where male GENDER and increasing YEARS IN PRACTICE predicted the strong (i.e., finite complement) variant. The YEARS IN PRACTICE result is consistent with the larger outpatient medicine sample as well as **Hypothesis 11**. Pediatricians, like physicians in general, appear to be tending towards a more forceful MAE structure with time in practice. More experienced Pediatricians may be using finite complement MAE to reinforce expert personae in interaction, indexing their confidence and trustworthiness in a perceptually salient way. In a similar vein, the observation that strong MAE COMPLEMENT types are associated with male Pediatricians may be a function of gender-specific strategies for negotiating the pediatrician-patient-caregiver interaction. As summarized in the discussion of **Hypothesis 12**, West's (1990) discourse-analytic work on physician directives found that female physicians primarily relied on mitigated directives. Again, 'mitigated' in Labov and Fanshel's (1977) terminology essentially referred to compar-

Table 4.5 Significant linguistic predictors of physicians' use of the finite form of COMPLE-MENT in the pediatrics MAE sub-sample.

Finite v. infinitival complement				
grand mean 'finite'		0.36		
df		4		
total N		230		
deviance		252.08		
	FW	**log odds**	**% finite**	**N**
Intended agent		p<0.01		
personal	0.764	1.176	0.712	59
non-personal	0.236	-1.176	0.240	171
range	52.8			
Verb type		p<0.01		
other	0.678	0.747	0.384	203
mental verb	0.322	-0.747	0.185	27
range	33.4			
Physician ID		(random intercept)		

atively indirect, hedged forms. Thus female physicians appeared to be using more indirect interactional strategies, weakening the imperative force of their requests for interpersonal effect. My data are consonant with this implication insomuch as infinitival complement forms represent a less forceful, less direct variant of MAE. However, my perception results do not necessarily support the efficacy of this strategy, as infinitival MAE forms did not enhance patient perceptions of physician empathy. It is important to recall, however, that physician GENDER was not a significant predictor of MAE COMPLEMENT type in the overall medical production sample. This suggests that Pediatricians share GENDER as an in-group, specialty-based constraint in a way that differentiates them from other medical practition-ers. MAE may have specialized meanings within this context. For example, weak forms may be perceived as respectful of the authority of the child/ adolescent patient's caregiver (who is generally present in pediatric visits), a meaning that was not specifically tested in my perception experiment. Alternatively, in the case that weak MAE forms do principally

convey a lack of confidence/ trustworthiness in pediatrics, female Pediatricians may be using other structures or speech acts to interactionally construct confidence and trustworthiness with their patients/ patient-caregivers.

Table 4.6 Significant social predictors of physicians' use of the finite form of COMPLEMENT in the pediatrics MAE sub-sample.

Finite v. infinitival complement				
grand mean 'finite'		0.36		
df		4		
total N		230		
deviance		285.9		
	FW	**log odds**	**% finite**	**N**
Physician gender		p<0.01		
male	0.639	0.573	0.395	195
female	0.361	-0.573	0.171	35
range	27.8			
Years in practice		p<0.01		
increasing		0.052		
Physician ID		(random intercept)		

4.3.1.3   Diabetes sample

For the diabetes sample, poor distribution of some linguistic factors made it impossible to effectively model linguistic constraints on diabetes specialists' selection of finite MAE. Thus the analysis is limited to social factors: YEARS IN PRACTICE, physician GENDER, patient GENDER, patient ETHNICITY, and patient disease SEVERITY (or, more specifically, HBA1C for the purposes of this sample). Increasing HBA1C (a measure of disease SEVERITY) was the only significant fixed predictor of COMPLEMENT within diabetes (see Table 4.7). As mentioned above, HbA1C is a long-term indicator of blood glucose levels. It is the clinically accepted standard for determining diabetic control and the primary measure for assessing the effectiveness of one's treatment plan. Thus, it seems as if physicians are using a stronger

Table 4.7 Significant social predictors of physicians' use of the finite form of COMPLEMENT in the diabetes MAE sub-sample.

Finite v. infinitival complement				
grand mean 'finite'		0.28		
df		3		
total N		156		
deviance		178.69		
	FW	**log odds**	**% finite**	**N**
HbA1C		p= 0.034		
increasing		0.23		
Physician ID		(random intercept)		

MAE form with patients who are at a greater risk for diabetic complications from poor glycemic control or inadequate treatment/ adherence. This indicates that, at the condition level, MAE use is impacted by patient characteristics. Furthermore, it demonstrates that these characteristics include biomedically salient categorizations and metrics, factors that physicians are socialized into appreciating and interpreting. It also supports **Hypothesis 14**, which predicts a positive, direct relationship between MAE strength and patients' disease severity.

Interpreted with respect to the perception results in Section 3.3.4, the relationship observed here suggests that physicians may be using MAE COMPLEMENT variation as one of many potential communicative strategies to promote medication adherence. More specifically, they are most likely to use a strong COMPLEMENT, one that conveys trustworthiness and confidence, with patients for whom non-adherence is associated with profound health-related risks. This further suggests that physician MAE production may be driven (in part) by perceptual goals. This interpretation is consistent with Lee and Lin's (2009) results showing that diabetic patients are more likely to adhere to treatment regimens when they trust their physicians (see the discussion of **Hypothesis 11** above).

4.3.1.4 Osteoporosis sample

As in the diabetes sub-sample, I was forced to limit my model of COMPLEMENT in osteo-porosis interactions to social predictors due to a poor distribution of linguistic factors in the sub-sample. I included physician GENDER, YEARS IN PRACTICE, and SEVERITY as potential fixed predictors for COMPLEMENT type, excluding patient ETHNICITY and GENDER based on unbalanced sampling in line with known epidemiological characteristics of osteoporosis.[12] In further analogy to the diabetes sub-sample, SEVERITY was the sole retained factor pre-

Table 4.8 Significant social predictors of physicians' use of the finite form of COMPLEMENT in the osteoporosis MAE sub-sample.

Finite v. infinitival complement				
grand mean 'finite'		0.31		
df		4		
total N		113		
deviance		132.81		
	FW	log odds	% finite	N
Disease severity		p=0.04		
severe	0.742	1.054	0.600	15
mild	0.391	-0.442	0.270	37
moderate	0.352	-0.612	0.262	61
range	39			
Physician ID		(random intercept)		

dicting finite complements in the osteoporosis sub-sample (see Table 4.8). Severe disease is associated with the use of strong, finite complement forms, while mild and moderate disease levels are associated with the relatively weak infinitival forms. This finding offers additional corroborating evidence for **Hypothesis 14**. Furthermore, it supports my proposal that physicians' MAE use is conditioned by biomedically significant social factors at the level

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[12]Osteoporotic patients are classically female, white, and post-menopausal. That is not to say that osteoporosis does not occur in young, non-white, and/ or male individuals, but such cases are too rare to model in this study.

of disease condition. It also highlights the fact that physicians attend to different social factors based on the nature of the disease state and its clinical manifestation. For example, osteoporosis has quantitative measures of severity (e.g., bone density T-score), but they are not as central to the treatment of osteoporosis as HbA1C is to diabetes. From this clinical perspective, it is unsurprising that a holistic, subjective measure of SEVERITY would hold predictive value in osteoporosis as opposed to an objective test result. Said findings support my more general argument for the role of professional socialization in physicians' MAE use. Physicians seem to be modulating MAE strength in a way that reflects their experience with treating certain conditions and types of patients.

4.3.1.5 Coronary artery disease sample

The coronary artery disease (CAD) sample data were sufficiently well-distributed to allow for the simultaneous modeling of both social and linguistic factors conditioning COMPLEMENT.[13] Nonetheless, only a single, linguistic feature was retained: intended MODAL AGENT (Table 4.9). This feature was also significant for both the pediatric and outpatient medicine samples with the same directionality. These results collectively indicate that co-variation between COMPLEMENT and intended MODAL AGENT is consistently present in my data as opposed to predominating in a set of specialty or condition-specific tokens.

The lack of other predictors for finite MAE in CAD could be interpreted in various ways. It could be the case, for instance, that COMPLEMENT is not the most salient MAE feature in CAD interactions. CAD specialists could be using other MAE and non-MAE based linguistic resources to convey recommendation strength and to construct confidence and/ or trustworthiness. Qualitative reviews of the data hinted at this possibility. Instead of COMPLEMENT variation, frequent and lexically diverse intensifier use seemed to characterize the MAE tokens in CAD. The apparent patterns observed for this feature will be addressed in Section 4.3.3 on INTENSIFICATION.

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[13]As stated in Section 4.2, physician GENDER was omitted from this analysis due to poor representation of female Cardiologists in the corpus.

Table 4.9 Significant predictors of physicians' use of the finite form of COMPLEMENT in the coronary artery disease MAE sub-sample.

Finite v. infinitival complement				
grand mean 'finite'		0.39		
df		3		
total N		157		
deviance		180.82		
	FW	**log odds**	**% finite**	**N**
Intended agent		p<0.01		
personal	0.74	1.046	0.603	63
non-personal	0.26	-1.046	0.245	94
range	48.0			
Physician ID		(random intercept)		

4.3.2   MODAL AGENT variation

Semantic variation across personal (e.g., *it's important for you to...*) and non-personal (e.g., *it's important (for me) to...*) modal agents served as the second of three dependent variables in my production study. Sub-section 3.3.3 demonstrated that personal modal agents are perceived as having more imperative force than non-personal modal agents. The hypotheses in (30) predicted that these strong and weak variants would co-occur with other strong and weak features respectively, forming variant classes. Though the collective hypotheses of (30) refer to both strong and weak features/ classes, the strong, personal form will be used as the application value for the MODAL AGENT regression analyses reported in this Section in order to maintain consistency across dependent variables. Based on **Hypothesis 9**, it is expected that other strong features (i.e., finite complements, intensifiers, and non-mental verbs) will predict the occurrence of personal modal agents. Furthermore, social factors such as patient GENDER, physician YEARS IN PRACTICE, etc. (see 31-37) are predicted to provide additional constraints.

4.3.2.1   Outpatient sample

In contrast to the previous model for the overall outpatient sample—where COMPLEMENT was used as the dependent variable—the intended MODAL AGENT model only retained a single factor as significant. Unsurprisingly, this was the COMPLEMENT factor (see Table 4.10). Section 4.3.1 already observed a correlation between COMPLEMENT and intended MODAL AGENT, which was interpreted as evidence for **Hypothesis 9** and **Hypothesis 10**. The same relationship is significant when MODAL AGENT is used as the dependent variable. Importantly though, the MODAL AGENT model lacks additional linguistic and social predictors.

Table 4.10 Significant predictors of physicians' use of the personal form of MODAL AGENT in the entire outpatient medicine MAE sample.

Personal v. non-personal agent				
grand mean 'personal'		0.416		
df		2		
total N		1857		
deviance		1637.624		
	FW	**log odds**	**% intensified**	**N**
Complement		p<0.01		
finite	0.852	1.748	0.883	613
infinitival	0.148	-1.748	0.186	1244
range	70.4			

Based on the observation that COMPLEMENT and MODAL AGENT appear to be fundamentally inter-related in my data, I compared the quality and interpretation of their respective models. The model for COMPLEMENT is more parsimonious than the intended MODAL AGENT model, as indicated its lower AIC score (AIC$_{\text{COMPLEMENT}}$= 1448.13, AIC$_{\text{MODAL AGENT}}$= 1641.624). Perhaps more importantly however, the COMPLEMENT model shows evidence that finite-infinitival COMPLEMENT variation is sociolinguistically meaningful in physician speech. Conversely, the intended MODAL AGENT model does not provide any evidence for socially

purposeful variation. For these reasons, I do not report any further results with respect to MODAL AGENT. Instead, I assume that COMPLEMENT is the socially evaluated aspect of COMPLEMENT–MODAL AGENT co-variation in physicians' MAE use.

4.3.3 INTENSIFICATION variation

INTENSIFICATION, treated here as the alternation between intensified and non-intensified MAE forms, is the last of three dependent variables used in this analysis. Intensified forms were found to carry a greater degree of imperative force than non-intensified forms, as per the perception results given in Sub-section 3.3.3. As such, intensified forms belong to the strong MAE variant class formalized in **Hypothesis 9**, while non-intensified forms constitute part of the weak MAE variant class described in **Hypothesis 10**. In accordance with previous Sub-sections, the strong variant will be the application value for regression analyses reported here. Again, the prediction (as stated in 30) is that other strong features (i.e., personal agents, finite complements, and non-mental verbs) will correlate with the strong, intensified form. A subset of the social characteristics outlined in (31)-(37) is also expected to contribute to models of INTENSIFICATION.

4.3.3.1 Outpatient sample

Intensifier use in the entire outpatient sample was modeled by four factors: COMPLEMENT, VERB TYPE, patient ETHNICITY, and patient disease SEVERITY (see Table 4.11). Intensified forms are predicted by finite COMPLEMENT, non-mental VERB TYPE, relatively severe disease SEVERITY, and Hispanic/ Asian patient ETHNICITY. The two significant linguistic factors, VERB TYPE and COMPLEMENT, support the hypotheses in (30) both in terms of their retention and their directionality. Intended MODAL AGENT trends in the expected direction as well, with more personal forms associating with intensified forms than with non-intensified forms. This difference is significant as per a χ^2 test of independence across the intensified and non-intensified distributions: (1, N = 1857)= 8.33, p < 0.01, despite the fact

Table 4.11 Significant predictors of physicians' use of the intensified form of INTENSIFICA-TION in the entire outpatient medicine MAE sample.

Intensified v. non-intensified				
grand mean 'intensified'		0.4		
df		8		
total N		1857		
deviance		2453.47		
	FW	**log odds**	**% intensified**	**N**
Complement		p<0.01		
finite	0.543	0.174	0.465	613
infinitival	0.457	-0.174	0.367	1244
range	8.6			
Verb type		p<0.01		
other	0.569	0.278	0.416	1631
mental verb	0.431	-0.278	0.279	226
range	13.8			
Race		p=0.017		
other	0.578	0.315	0.522	92
hispanic	0.534	0.136	0.486	107
black	0.453	-0.188	0.412	284
white	0.435	-0.263	0.382	1374
range	14.3			
Severity		p=0.04		
severe	0.544	0.175	0.449	312
moderate	0.499	-0.002	0.408	898
mild	0.457	-0.172	0.365	647
range	8.7			

that intended MODAL AGENT was not selected for the multiple logistic regression model of INTENSIFICATION. Thus, collectively, INTENSIFICATION provides additional evidence that the strong and weak MAE features identified in my perception study are in fact co-varying within their own, strength-based variant classes.

The two social factors that were retained in my model of INTENSIFICATION, patient dis-

ease SEVERITY and patient ETHNICITY, pertain to **Hypothesis 14** and **Hypothesis 17** respectively. The association between severe disease SEVERITY and strong, intensified forms is in line with previous findings for COMPLEMENT type in the diabetes and osteoporosis sub-samples. Generalizing over both dependent variables, it seems to be the case that more severely ill patients tend to receive proportionally more strong MAE forms. As suggested above with respect to the COMPLEMENT findings, the relationship between SEVERITY and strong forms may be indicative of physicians having been socialized into classifying patients into medically relevant categories such as "severely ill" versus "moderately ill". Physicians' training, along with their shared experiences in practice, lead them to consistently recognize indicators of these severity categories and map them onto readily appreciable patient presentations.[14] Physicians not only evaluate severity consistently, but they also converge on the production of relatively direct, confident-sounding variants in response to elevated patient risk. This response may represent an interactional strategy targeted at increasing the likelihood that patients will adhere to their recommendations. Similarly, in the case of patient ETHNICITY, physicians may be relying on biomedically relevant perceptions of patients' likelihood to adhere to treatment regimens and modulating their MAE use as one tactic to compel adherence. That being said, the level ordering for patient ETHNICITY shown in Table 4.3.3—with Hispanic and Asian[15] ethnicities favoring intensifier use while black ethnicity disfavors intensifier use—is discordant with the literature on physician perceptions of patient adherence. Numerous studies report a difference between physician estimates of white and non-white patients' adherence, finding that non-white patients are perceived to be less adherent than white patients (van Ryn & Burke 2000; Phillips, Leventhal, & Leventhal 2011, a.o.). No known studies contrast Hispanic/ Asian and black patients, however, suggesting that the ETHNICITY pattern observed here may be confounded by language pro-

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[14]For example, appearing older than one's chronological age is taught to be a sign of chronic and/ or severe illness.

[15]Asian ethnicities (e.g., Korean, Chinese, Vietnamese) form the majority component of the 'other' ethnicity category. Individuals of Middle-eastern and Philippine decent are also included in this grouping, but they are greatly outnumbered by Asian sub-ethnicities.

ficiency stereotypes. Physicians might be adjusting their MAE use based on the perception that Hispanic or Asian patients lack health literacy skills in English, a characteristic that could impact their ability to adhere to treatment regimens. Unfortunately, this proposal cannot be tested using the current dataset. Other possible explanations include interactions between ethnicity and perceived biomedical risk[16] as well as ethnicity-based differences in interactional style.

4.3.3.2 Coronary artery disease sample

As an exploration of the seemingly distinctive intensifier use observed in the CAD data (see the discussion in Sub-section 4.3.1), I created a quantitative model to predict intensifier presence in the coronary artery disease (CAD) sample. I limited this model to the following predictors: VERB TYPE, intended MODAL AGENT, YEARS IN PRACTICE, patient GENDER, patient ETHNICITY, and disease SEVERITY.

The CAD intensifier model (see Table 4.12) yielded two fixed predictors: VERB TYPE and patient RACE[17]. VERB TYPE patterned as expected based on the overall sample. The strong, action verb feature variant predicted intensifier presence, another strong variant. Similarly, patient RACE demonstrated consistency with the larger sample, where patient ETHNICITY also predicted INTENSIFICATION. Within the CAD sub-sample, non-white patients were more likely to receive intensified MAE forms. As suggested for the entire outpatient sample, this finding may lend variationist support to claims in the medical communication literature pointing to disparities between the way physicians communicate with white populations and

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[16]There are known, condition-specific epidemiological associations between ethnicity and disease/ complication risk. For example, lupus erythematosus, a systemic autoimmune disorder, is 2-3 times more common in black and Hispanic individuals than in white populations (Kumar 2009:215). Though I tested for an interactional effect from SEVERITY-ETHNICITY at a sample level with negative results, condition-specific confounds may exist, complicating the overall distribution.

[17]The patient ETHNICITY predictor was simplified into a white/ non-white binary factor for this analysis, as opposed to the multi-level system used in Chapter 4. I use RACE as a label for the white/ non-white distinction as ethnicity is not represented in these new categories, thus rendering the ETHNICITY label inappropriate.

Table 4.12 Significant predictors of physicians' use of the intensified form of INTENSIFICA-TION in the coronary artery disease MAE sub-sample.

Intensified v. non-intensified				
grand mean 'intensified'		0.497		
df		4		
total N		157		
deviance		204.9		
	FW	**log odds**	**% intensified**	**N**
Verb type		p=0.04		
other	0.634	0.551	0.529	136
mental verb	0.366	-0.551	0.286	21
range	26.8			
Patient race		p=0.02		
non-white	0.615	0.47	0.655	55
white	0.385	-0.47	0.412	102
range	23.0			
Physician ID		(random intercept)		

the way they communicate with non-white populations (Street et al. 2007; Johnson et al. 2004; Ashton et al. 2003). It may also be related to clinical notions of risk, as indicated by my models of COMPLEMENT variation in the diabetes and osteoporosis sub-samples.

With respect to CAD in particular, the relationship between intensification and non-white patients complements reports in the medical literature on communication surrounding a common medical procedure within CAD: percutaneous cardiac intervention (i.e., stenting). Stenting involves the placement of a wire mesh or medicated plastic (i.e., drug-eluting) tube in a partially blocked coronary artery. It is done to prevent total blockage and subsequent myocardial infarction (i.e., heart attack). Though selection of stent type—bare metal or drug-eluting—is still controversial, many studies suggest that drug-eluting stents lead to better outcomes in patients who are maintained on anticoagulant (clot prevention) therapy. In other words, if patients are able to consistently take medication after their stent has been placed, they may experience a longer or higher quality life with the drug-eluting option. Con-

versely, if patients receive a drug-eluting stent and do not adhere to their medication regimen, they are more likely to have a potentially life-threatening complication (thrombosis). Gaglia et al. (2010) found that non-white patients were less likely to receive drug-eluting stents, independent of their socioeconomic status. At the time of Gaglia and colleagues' work, professional societies were explicitly cautioning providers to avoid drug-eluting stents in patients who might not be willing or able to take the required post-stenting medications. Having accounted for patients' ability to pay for the procedure and associated medications, Gaglia et al.'s results suggest that physicians were using patient race as an indication of whether or not patients would adhere. CAD specialists may be mapping biomedical risk onto patient ethnicity, where non-white individuals are viewed as high-risk patients for thrombotic complications based on assumptions about their likelihood of adhering to treatment. As applied to MAE, physicians may be subconsciously indexing a shared perception of non-white patients as high-risk CAD patients through their production of intensifiers, producing stronger, more direct MAE forms when interacting with these patients. Alternatively, it is also possible that RACE is an independent factor conditioning the production of intensifier MAE, one that is unrelated to the notion of clinical risk. In either case, physicians' intensified MAE use appears to be mediated by patient RACE, either directly or indirectly.

4.4   Summary

Chapter 4 outlined numerous hypotheses for physicians' production of syntactic/ semantic MAE variation, described my production methodology with respect to these structural features, and reported results specific to my hypotheses. The primary objective of my structural production study was to test the concept of pragmatic co-variation, where multiple, feature-specific variants behave as a cohesive variant class. The secondary aim of this experiment was to demonstrate socially meaningful constraints on MAE use that would be suggestive of professional identity construction within the context of medical recommendation provision. In order to address these objectives, I mined a large, US-wide corpus of naturalistically

recorded physician-patient interactions. I extracted tokens of MAE and coded them for a variety of linguistic and social factors posited as potential sources of MAE variation. Three structural features: COMPLEMENT, intended MODAL AGENT, and INTENSIFICATION were treated as dependent variables in the analysis, acting as hypothesized loci of 'weak' and 'strong' alternation. The remaining factors served as independent hypothesized predictors. The following discussion, organized around the two aims of this study, reviews my findings on a hypothesis-by-hypothesis basis.

The hypotheses in (30) represented my objective of assessing co-variation among strong and weak MAE features. Though **Hypothesis 9** is framed with respect to strong features and **Hypothesis 10** is stated with regard to weak features, these two hypotheses were generally addressed as a unit, where strong variants were treated as application values in the various regression models presented in this Chapter. Collectively, these models provided ample evidence in favor of the co-variation hypothesis. Strong features consistently correlated with one another. There were no cases in which a weak feature predicted a strong one. Thus, it is reasonable to conclude that 'strong' and 'weak' are variants of imperative force. Likewise, imperative force is a true sociolinguistic variable, representing two cohesive variant classes.[18]

In similar form to (30), there were a set of social hypotheses speaking to the secondary objective of my structural production study that repeatedly correlated with strong MAE features: physician YEARS IN PRACTICE, physician GENDER, patient disease SEVERITY, and patient ETHNICITY. Physician YEARS IN PRACTICE predicted COMPLEMENT in the outpatient medicine sample and the pediatrics sample, supporting **Hypothesis 11** (i.e., that physicians would increase their use of strong forms with increasing YEARS IN PRAC-TICE). This finding was interpreted in terms of physicians' professional socialization. For either interactional or intra-professional reasons, physicians appear to be using more direct,

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[18]More specifically, the fact that strong and weak MAE feature variants co-vary demonstrates that obligatory force is a linguistic variable. It does not necessarily imply that obligatory force variation is a *socio*-linguistic process. That being said, physicians' gender and experience-based tendencies towards the use of strong (v. weak) MAE feature variants clearly establish that obligatory force variation is both socially and linguistically determined.

confident-sounding MAE forms as they gain experience. Physician GENDER was significant in the pediatric sample, a sub-sample of the COMPLEMENT analysis. **Hypothesis 12** had proposed that male physicians would use a greater proportion of strong forms than female physicians. As predicted, male physicians used proportionally more of the direct forms. This result pointed to specialty-specific, gendered interactional strategies involving MAE. Analogously, my results for patient disease SEVERITY indicated interlocutor effects from interacting with patients exhibiting certain medical characteristics could impact physicians' MAE use. Disease severity was significant in the diabetes and osteoporosis samples of the COMPLEMENT analysis as well as the outpatient medicine sample of the INTENSIFIER analysis. These results provided evidence for **Hypothesis 14**, which predicted that strong MAE features would associate with more severely ill patients. The implication of this finding was that physicians were applying professional knowledge and experience in addition to more general social intuitions when selecting MAE forms. Lastly, patient ETHNICITY was significant in the outpatient and coronary artery disease samples when testing INTENSIFIER variation. These results did not support **Hypothesis 17** in that this hypothesis predicted a contrast between white and non-what patients (i.e., that non-white patients would receive more strong forms than white patients). Instead, the data showed a difference between the MAE forms produced with Hispanic/ Asian patients and white/ black patients, with Hispanic/ Asian patients receiving strong, intensified forms. This unexpected grouping was tentatively explained with reference to the interplay between ethnicity and presumed language skills: physicians might have used ethnicity (along with other cues) as an indicator of healthy literacy, producing stronger, more direct forms with patients who may be at risk of not understanding and thus not adhering to treatment recommendations. Ultimately however, this interpretation could not be tested here, leaving the relationship between MAE form and ETHNICITY to be further explored in future work.

In contrast to the preceding social hypotheses, there were three social hypotheses given in Sub-section (4.1) for which no evidence or counter-evidence was found. These pertained to

patient GENDER (**Hypothesis 15**), patient EMPLOYMENT STATUS (**Hypothesis 16**), and physician SPECIALTY (**Hypothesis 13**). Male and unemployed patients were hypothesized to receive proportionally more strong forms than female, employed patients. Furthermore, specialized physicians were expected to issue more strong MAE recommendations than general practice physicians. These parameters were not found to influence structural variation in physicians' MAE use and, as such, they will not be considered as potential predictors of physicians' pitch contours in my analysis of MAE intonation in Chapter 5.

Chapter 5

MAE production: intonation

The preceding Chapter focused on physicians' variable production of the fundamental syntactic and semantic components of MAE, a necessary but insufficient step towards understanding physicians' use of MAE as a pragmatic and stylistic device. A thorough description of variation in MAE forms must also attend to MAE's potential semiotic hitchhikers (see Section 2.4). Chapter 3 determined that of two possible hitchhikers considered here, rising intonation and creaky voice, rising utterance-final intonation was the only non-essential, suprasegmental feature to carry social meaning from a perception standpoint. For this reason, I focus solely on utterance-final intonation contours in the current production study. I utilize the same sample of naturally occurring, physician-generated MAE tokens analyzed in Chapter 4 in order to assess physicians' use of falling, level, and rising utterance-final contours. Assuming the pragmatic and social interpretations determined by the judgement task in Chapter 3, I interpret rising intonation as the weak variant and compare its distribution to that of the other weak variants studied in Chapter 4. This allows me to characterize the relationship between structural MAE features, intonation, and their respective social correlates. I will demonstrate that intonation shares social constraints with MAE's structural features, but that rises play a unique role in physicians' MAE-based stylistic repertoires.

5.1 Objectives and hypotheses

The central objective of my intonation-focal production study is to investigate the effect of variable type on co-variation within MAE. Chapter 4 offered substantial evidence in support of the hypothesis that MAE's structural features co-vary within strong and weak variant classes, but it only considered semantic/ syntactic variation. In contrast to the variable

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processes studied in Chapter 4, intonation contours are both prosodic and non-essential to the MAE construction. In addition to these linguistic distinctions, I have already presented some indications that intonation may behave differently for social reasons. Chapter 3 reported that participants found high rising intonation patterns (HRTs) to not only be relatively weak and less confident-sounding when compared to level intonation, but also to be less empathic. It seems likely that these collective dissimilarities could cause rising intonation to pattern independently from other weak features. From this perspective, the aim of the intonation production study is to test the generalizability of the co-variation hypothesis: do all weak features cluster together in MAE or do layers of variation modulate one another, contributing weak and strong elements to create assertive yet tempered recommendations? Secondarily, this study examines the social and stylistic implications of intonation's variability. It asks whether or not the social factors predicting weak structural variants also predict rising intonation. In other words, how do rises function in the construction of an expert, authoritative physician persona? The hypotheses below work towards this question by testing discrete linguistic and social predictions for rising contours that characterize rising MAE as a stylistic act.

5.1.1 Hypotheses for intonation correlations

The following hypotheses predict potential associations between rising intonational contours, MAE's weak structural forms, and the social factors found to constrain MAE form in Chapter 4. Social factors that were not found to be significant in the preceding Chapter are omitted here in accordance with this Chapter's primary objective: to describe MAE's intonational variation with respect to the patterns observed for MAE's inherent structural features. The remaining hypotheses listed below will be tested by means of multiple regression (as opposed to multiple logistic regression) and are therefore framed in terms of correlations between two factors. Furthermore, these hypotheses are stated in the direction of the rising contour because this variant is generally regarded as the most salient one. This directionality also

conforms with the perception results reported in Chapter 3, where the rising form was the target of participant evaluations. Again, the hypothesis numbers provided for each prediction continue the numbering system established in prior Chapters.

(38)   **Hypothesis 18**: Weak MAE features (infinitival complements, mental verbs, lack of intensification, and non-personal modal agents) will correlate with rising intonation

(38) formalizes the intuition that weak 'hitchhiker' (cf. Mendoza-Denton 2011) features such as rising intonation will co-vary with weak structural features, thus producing a cohesive pragmatic and stylistic unit. As noted above, there is reason to suspect that intonation will not follow suit with the weak MAE variant class characterized in Chapter 4. Nonetheless, assuming consistency is a reasonable starting point. An outcome wherein weak intonation does correlate with weak structure, supporting (38), would suggest that physicians use pragmatic resources in concert to produce internally congruent recommendation styles regardless of linguistic (structural v. suprasegmental prosodic) and evaluative (apathetic or neutral sounding) distinctions between variable types. Conversely, rising intonation may be used to attenuate or soften a strong MAE structure (see the discussion of Heath's use of rises in Chapter 2). A result in which rising intonation does not behave like the weak structural variants alludes to differences between types of variables, where 'hitchhiker' variables may be used to modulate the pragmatic and stylistic interpretations of the forms on which they travel.

(39)   **Hypothesis 19**: Use of pronounced, rising intonational contours will correlate with decreasing physician years in practice

Building from (38), (39) predicts that physicians will become more direct as they gain experience practicing medicine. Chapter 4's results have already substantiated this hypothesis to some degree, as weak structural variants were less likely to be produced by more professionally mature physicians. When interpreted with respect to my perception results, physicians seemed to be tending towards more confident, trustworthy sounding strong MAE forms over

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time. One might expect the social pressure towards strong MAE forms would be more forceful for intonation than for structural variants, as rising intonation was perceived to be apathetic as well as uncertain (see Section 3.3.4). That being said, there is a possibility that strong (falling or level) intonation layered onto a strong MAE structure could be overly assertive. In this latter scenario, rising intonation could serve to soften the overall MAE form, acting as a polite hedge. Though both of these options are seemingly well-motivated from a social standpoint, (39) favors the direction taken by (38) for the sake of consistency.

(40) **Hypothesis 20**: Use of pronounced, rising intonational contours will be associated with female physicians as opposed to male physicians

In analogy to (32) in Section 4.1.1, (40) applies concepts from the literature on gender differences in physician speech along with the broader literature on gendered interaction. Female physicians in particular have been found to be less direct in their patient interactions than male physicians. The discussion of (32) highlights some relevant evidence in support of this generalization. Of additional relevance to (40), women are often said to use more rising intonation than men. Lakoff (1973), one of the first linguists to champion this belief, suggested that the apparent disparity in intonational preferences is due to women's tendency towards taking uncertain or non-committal stances. More recent research has called this claim into question. McConnell-Ginet (1983), for example, enumerates the many functions that rising intonation can serve aside from the expression of uncertainty (see Section 2.4 for a review). There is no reason, she indicates, that the function of women's rises should represent only one of these uses. She implies that intonational functions must be identified and directly compared in order to make a conclusion about female rises. Linneman's (2013) study of women's intonational contours in the context of a televised game show attempts such a quantification. Focusing exclusively on the context of contestants' single-utterance answers, it showed that while female contestants did produce more high rising terminals, a specific sub-type of rising intonation, their use of HRTs was associated with being in the lead. Thus it seems unlikely that their HRTs were indexing uncertainty in the sense of cognitive

state reporting. Despite the lack of consensus on what women are generally doing with their rising contours, prior research collectively supports the hypothesis that female physicians will use proportionally more rises than male physicians.

(41) **Hypothesis 21**: Use of pronounced, rising intonational contours will correlate with decreasing severity of patients' medical conditions

Patient disease severity was found to positively associate with physicians' use of strong structural variants in Chapter 4. As stated in (41), a similar finding is expected for intonation contours. That is to say, weak, relatively uncertain-sounding rises are predicted to occur less frequently with severely ill patients. The social motivation behind this hypothesis is that physicians will feel pressured to use direct, confident sounding recommendations with patients who have the most at stake in terms of biomedical risk. To the extent that strong variants encourage patients to adhere to treatment regimens, physicians may be socialized into avoiding all types of rises with severe patients in order to sound maximally compelling when providing their treatment recommendations.

(42) **Hypothesis 22**: Greater use of pronounced, rising intonational contours will be associated with white patients than with non-white patients

As summarized in the presentation of (37), reports in the medical literature indicate that physicians are more directive and/ or dominating when interacting with non-white patients than when interacting with white patients. Sub-section 4.3.3 showed that comparatively directive, strong MAE structures are correlated with Hispanic and Asian patient interaction, a result that was partially consistent with suggestions in the literature. Based on this limited evidence, (42) hypothesizes that pragmatically weak, rising contours will be associated with white patients. Again, this relies on the purported interpersonal use of rises to convey politeness and deference. Though this is known to be only one of many uses for rising contours, it may be the case that an increase in hedge-type uses drives up the overall proportion of rises in physicians' MAE-type recommendations to white patients. Conversely, declining

contours may be used as one potential resource for asserting dominance in non-white patient recommendations.

The subsequent Section describes my methodology for testing (38)-(42). The hypotheses given in (38)-(42) will be referenced in the elaboration of my intonation-specific procedures as well as in the ensuing discussion of my results.

5.2   Methodology

For my study of MAE-associated utterance-final intonation contours in physician speech, I began with the same sample of MAE tokens as in Chapter 4. For this reason, the corpus description, extraction methods, and coding procedures provided in Section 4.2 still apply and will not be repeated here. However, due to the fact that the present investigation focuses on intonation, additional processing and token exclusion steps were necessary to ensure a sample fit for acoustic analysis. These procedures are reported in Sub-Section 5.2.1 along with a characterization of the final, post-processing intonation sample. Sub-section 5.2.2 details the analysis undertaken on this processed dataset. Unlike the structure-oriented production study outlined in the previous Chapter, the current production study combines multiple regression modeling with post-hoc qualitative analysis. The rationale and procedure for this mixed-methods approach are given in Sub-section 5.2.2 before moving on to Results in Section 5.3.

5.2.1   Sample selection and data processing

The starting point for my intonation-based production analysis was the 1,857 token sample of manually confirmed, physician produced MAE*imp* that had already been coded for linguistic and social factors (see Section 4.2), from which a sample of 861 tokens meeting the criteria for intonational analysis was derived. Figure 5.1 summarizes the sequence of token exclusions alongside their respective data processing steps. The initial step in moving from text-based tokens to audio clips was to time align and extract audio from recording-transcript

pairings. I accomplished this using MR Reveal (Kozloff & Barnett 2009), a proprietary time alignment and annotation environment linked to the Verilogue corpus. Tokens that could not be processed using this system were discarded (see Figure 5.1). MR Reveal produced utterance-level clips that needed to be manually edited. Using ELAN, a multi-modal transcription software package (Wittenburg et al. 2006), I segmented MAE*imp* tokens at the clause-level. That is to say, I identified the *it's important...* as the onset of each token and the next clause boundary as its terminus.[1] The vast majority of discards occurred at this step in processing. Tokens that were interrupted, restarted, cut off by the time aligner, or otherwise incomplete were excluded. Furthermore, tokens with background noise such as shuffling papers or a baby crying (common occurrences in natural recordings from physicians' offices) were also removed as to prevent untoward effects on the subsequent automated pitch tracking process. The remaining tokens were subjected to word-level alignment using the downloadable, Python version of FAVE Align (Rosenfelder et al. 2011). FAVE Align produced word-delimited TextGrids for each of the 861 tokens based on the Carnegie Mellon University (CMU)[2] pronunciation dictionary. Words that were not in the CMU, such as medication names, medical conditions, etc., were transcribed into ARPAbet characters[3] by hand.

The 861 finalized audio clips and corresponding TextGrids were loaded into Praat (Boersma & Weenink 2014) for pitch extraction. A custom script was used to extract pitch (i.e., F_0) measurements at 10ms intervals and to generate a log file with every measurement indexed

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[1]I determined the final clause boundary largely based on the syntactic structure of the sentence. In the case that a given token was ambiguous, usually due to conjunction, disjunction, or phrase-final discourse markers, I incorporated prosodic cues (i.e., pauses, stress patterns) in an attempt to retain the token. Truly ambiguous tokens, and those for which intonation was the only viable clue towards establishing a segmentation boundary, were discarded.

[2]See http://www.speech.cs.cmu.edu/cgi-bin/cmudict.

[3]ARPAbet is a standardized code used to represent the phonemic inventory of American English in ASCII characters.
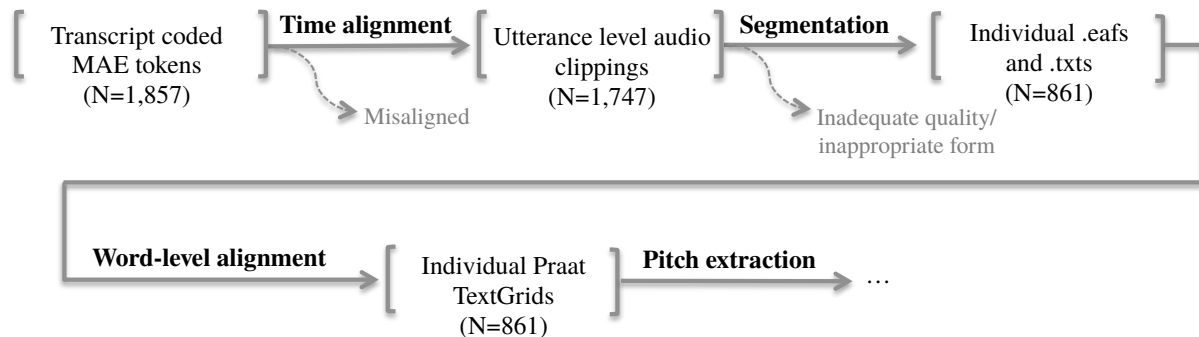
Figure 5.1 Data processing steps starting with the final structural analysis sample and ending with the intonation analysis sample. '.txt' and '.eaf' represent file extensions. The '.eaf' file extension is a primary output format of the ELAN transcription package.

for token number, lexical context, and clip time.[4] The script is given in Appendix B to facilitate replication of the quantitative analysis described in the following Sub-section.

In preparation for quantitative analysis, utterance-level transcripts representing the 861 audio clipped MAE tokens were aligned with their respective linguistic and social codes described in Section 4.2. An additional code for TURN POSITION was also appended to each token at this time. TURN POSITION, coded as either final or non-final, was included as an intonation-specific internal factor. It was intended to partially distinguish between textual and affective uses of utterance final rise (see Section 2.4.1), where connective, textual uses would be primarily turn internal.[5] Further discussion of this code and its interpretation can be found in Section 5.3.

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[4]The script described here was based on James Stanford's pitch extraction script, which he graciously provided along with very thorough documentation.

[5]TURN POSITION is obviously a rough indicator (at best) of a speaker's intention behind using a particular intonation contour. However, seeing that speaker intention is ultimately indiscernible in post-hoc analysis, this factor served as an objective, replicable way of accruing some discriminating evidence with respect to contour function.

5.2.2 Quantitative and qualitative analysis

Based on previous sociolinguistic work in intonation, especially Podesva's (2011) work on utterance-final rises in a medical context, I was most interested in modeling the clause-final slope of my MAE tokens. While sociolinguists have generally relied on subjective, auditory assessments of clause/ utterance-final intonation contours (e.g., Podesva 2011[6], McLemore 1991), recent phonetic literature has suggested that the boundaries between falling, level, and rising tunes are perceptually fluid (Levis 2002, Dilley 2010). For this reason, I opted for a mixed methods approach. This involved both a quantitative, regression-based analysis and a post-hoc qualitative review for salient perceptual and functional groupings.

5.2.2.1 Multiple regression modeling

In order to model the use of clause-final slope in my processed MAE tokens, I first had to derive a summary measure describing slope on a token-by-token basis. There were several potential approaches to this process given the form of my pitch data (iterative F_0 measurements taken at 10ms intervals), all centering upon some form of regression. Regression would provide the necessary pitch slope metrics on a token level, summarizing the distribution of pitch points measured for each token. Regressing over the entire MAE utterance, however, was not a viable option. Individual pitch events are generally composed of rise and fall sequences (Taylor 2000), resulting in a very poor fit for a linear model based on more than one such event. For this reason, my token-level pitch regression needed to focus exclusively on the final pitch event of the utterance, categorizing it as rising, level, or falling slope as appropriate. Furthermore, "final pitch event" needed to be defined in such a way as to facilitate comparable analysis across 861 tokens. This could be accomplished through one of two means: 1) a proportional, time-based cutoff where the final event was stipulated to occur in

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[6]Podesva (2011) reports both categorical and phonetic assessments of the intonation contours in his data, but his analysis is largely based on categorical labels produced through auditory analysis.

the last 10 percent of the utterance, 2) a mapping of "pitch final event" to utterance-final lexemes or syllables. The former approach, though desirable from a standardization stand-point, was determined to be overly arbitrary. Such a method could hypothetically create mid-word or even mid-syllable cutoffs that would be linguistically senseless. Thus I adopted the latter method, restricting my pitch regressions to the final word of each utterance. Word, or more specifically lexeme, was chosen over syllable for the reason that syllables span too few 10ms intervals to produce meaningful regression data. Moreover, polysyllabic words are more likely to contain nuclear pitch accents (which may occur on non-final syllables), making them a better representation of compound tone sequences.

I performed 861 linear regressions in R—one for the set of pitch points contained in the final word of each MAE token—and associated the resulting β values with their respective, fully coded tokens. I also noted the R^2 for these tokens as a measure of linearity. I then excluded tokens for which there were fewer than five pitch measurements and those with slopes more than two standard deviations away from the mean slope for the sample.[7] This resulted in a final count of 832 tokens paired with final word pitch slopes, R^2 values, and linguistic/ social independent variables.

I conducted a single multiple regression analysis predicting continuous pitch slope vari-ation in the overall sample. The specific predictors were LINEARITY (as measured by R^2), TURN POSITION (coded as final and non-final), COMPLEMENT TYPE, VERB TYPE, intended MODAL AGENT, INTENSIFICATION, physician YEARS IN PRACTICE, physician GENDER, pa-

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[7]Van Hofwegen (2013) suggests that statistical outliers, such as those removed here, are often loci for expressivity and/ or exceptional performances of a given style. With that in mind, I qualitatively reviewed a sub-sample of the tokens with extreme pitch slopes. In this particular case, these tokens did not appear to be performing stylistic work. Furthermore, some of them represented pitch tracker errors that supported the removal of such outliers from the sample.

tient disease SEVERITY, and patient RACE.[8] I did not sub-divide the overall, outpatient medicine sample into specialty or medical condition-based sub-samples for this analysis because the sub-sample sizes were not appropriate for quantitative analysis, comprising fewer than one hundred tokens per sub-sample.

Once again, my multiple logistic regression models were generated in the Rbrul environment (Johnson 2009) in R. A random effect of speaker was considered, but in similar form to my structural analysis, inclusion of this effect produced terminal errors in the model. This was assuredly due to the fact that very few physicians produced multiple MAE tokens. The results of this analysis are reported in Section 5.3. As in Section 4.3, the result table given in Section 5.3 only lists significant factors.

5.2.2.2 Post-hoc qualitative analysis

For the purpose of confirming and enhancing the interpretation of my quantitative findings, I generated a sub-sample of quantitatively identified rises for detailed review. As noted previously, rising contours are of particular interest based on their purported multifunctionality and their social significance in physician-patient interaction (see Sections 2.4.1 and 3.3.4 respectively).

Starting with the 832 parings of coded MAE tokens and pitch slope measurements created in the slope modeling process described above, I identified tokens whose pitch slope was more than one standard deviation away from the the mean pitch slope. This method was intended to objectively identify true rises, those whose contours should be perceptually distinct from level or falling tunes. It resulted in a set of 121 tokens with pitch slopes greater than 861.9Hz/s, thus forming a base sample for qualitative analysis. Additional sub-setting was performed on the base qualitative sample to target specific emergent hypotheses from my

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[8]As in Section 4.3.3.2, patient ETHNICITY was collapsed into a white/ non-white binary factor for this analysis. This conversion was necessary to maintain adequate cell sizes despite the considerably smaller sample utilized in the intonation experiment as compared to the structure-based analysis. In accordance with Section 4.3.3.2, I use RACE as a label for this condensed, white/ non-white distinction.

quantitative modeling. These further manipulations are described along with my qualitative findings in Sub-section 5.3.2.

Each token selected for qualitative review was considered in view of its entire interactional context. I read and listened to the transcripts containing these tokens, paying particular attention to the discourse immediately surrounding MAE-style recommendations. I also viewed the MAE pitch track and conducted a subjective auditory assessment of its intonation contour. The observations reported in Sub-section 5.3.2 integrate these data passes with respect to an interactional sociolinguistic framework (e.g., Hamilton 2004, Nelson & Hamilton 2007).

5.3 Results

Sub-sections 5.3.1 and 5.3.2 present my intonation results. Sub-section 5.3.1 discusses the findings from my multiple regression analysis of final-word intonation slopes in physicians' MAE tokens. Sub-section 5.3.2 takes a closer look at the positive slope tokens in their interactional context, further developing my characterization of physicians' stylistic use of MAE-final rises.

5.3.1 Modeling continuous MAE pitch variation

Pitch slope, represented by the β values from my regressions of each token's final-word F_0 measurements, is a continuous variable ranging from negative values, which indicate falling intonation, to positive values, which connote rising intonation. It is modeled by two significant predictors: LINEARITY and physician YEARS IN PRACTICE (see Table 5.1). Increasingly positive slope is predicted by increasing LINEARITY and increasing YEARS IN PRACTICE.

The positive association between physicians' MAE-final pitch slopes and LINEARITY suggests that as physicians' intonation contours tend towards more pronounced rises, their measured pitch points converge into relatively linear patterns. In other words, as physicians' rises

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Table 5.1 Significant constraints on physicians' use of rising intonation on the final word of MAE tokens.

Continuous pitch slope		
grand mean		171.8
df		3
total N		831
coefficient		
Linearity		p<0.01
increasing	472.7	
Years in practice		p=0.04
increasing	0.02	

become more extreme, they also become more linearly regular. This finding is best understood with reference to other possible pitch point patterns. Non-linearly distributed points could, for instance, be dispersed with no discernible pattern. Alternatively, they could represent a higher order, exponential, logarithmic, or other curve. Lastly, they could be partially linear, but discontinuous. All of these possibilities have perceptual correlates. In order to appreciate the actual relationship between LINEARITY and pitch, thus moving towards a perceptual interpretation, I pseudo-randomly selected tokens for visualization.[9]

Three representative tokens are plotted in Figure 5.2. Moving from left to right across the panels of Figure 5.2, the tokens increase in both slope and R^2, my measure of LINEARITY. On the left, the least linear/ steep rise appears to have multiple discontinuities. There is a step-up in pitch at approximately 15 normalized time units and at least one discrete jump at 35 units. The center token demonstrates a similar albeit less extreme version of this pattern. Lastly, in contrast to the previous two tokens, the most linear token (i.e., the rightmost panel) rises steadily with a slight uptick in pitch around 60 normalized time units. Interpreted collectively, the left and center panels may represent a L*+H⁻H% contour,

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[9]This process was pseudo-random in the sense that I applied an algorithm to generate a small sub-sample: I started with the first positive slope token (n) and sampled at n+50 increments moving towards the token with the greatest positive slope.
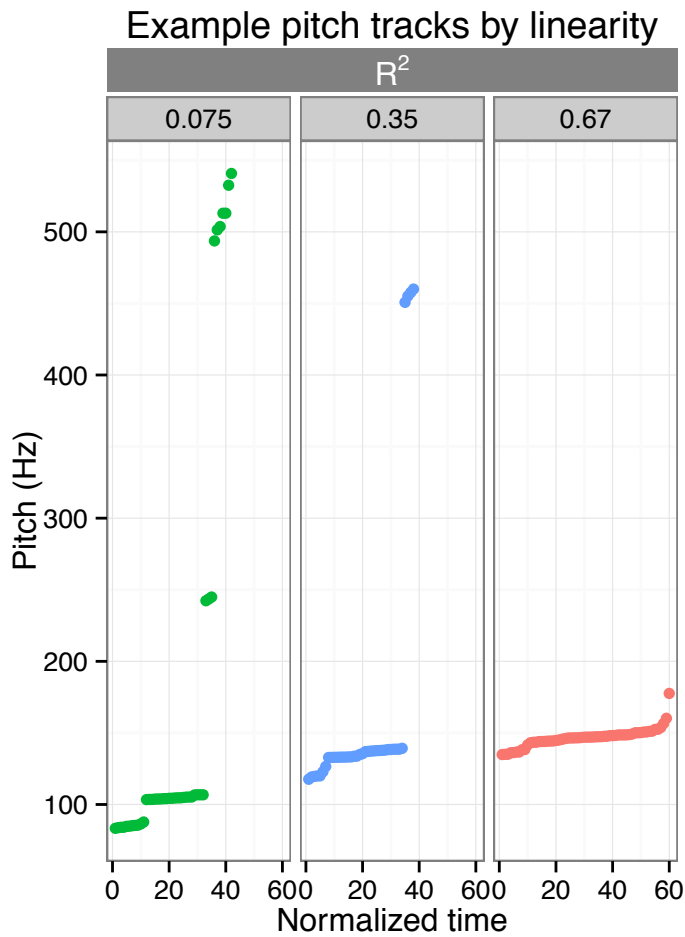
Figure 5.2 Three pitch tracks for pseudo-randomly selected MAE tokens arranged by increasing R^2 and β values from left to right.

while the rightmost panel could be a slow rise punctuated by H%. Irrespective of their formal representations, the first two panels have a more phonetically salient contour. They step and arc in a much more dramatic pattern than the third token. Assuming that this distinction is perceptually salient, these non-linear tokens may be more likely loci of stylistic work.[10]

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[10]As my discussion of LINEARITY suggests and Sub-Section 5.3.2 will further develop, continuous SLOPE modeling is not a reliable way of characterizing salient intonational patterns in and of itself. It can be used to differentiate rises from falls, but the realization of these contours must be assessed qualitatively with a combination of auditory methods and pitch track visualization. That being said, SLOPE modeling does seem to be an effective means of identifying high-level patterns (e.g., the observation that physician use of rises v. falls may be associated with their YEARS IN PRACTICE) for further evaluation.

Though TURN POSITION was not a significant predictor of SLOPE at α=0.05, non-turn final MAE tokens, those with the potential for intra-turn textual functions, were directionally associated with increasing pitch slope (p=0.11). Integrating this non-significant yet suggestive effect with the significant predictors in Table 5.1, it appears as if increasingly positive SLOPE correlates with increasing LINEARITY and, to a lesser extent, non-final turn position. This conjures an image of highly regular, steep rises being used to organize discourse by connecting related utterances, one that can only be confirmed by analyzing tokens in their interactional context. Thus the relationship between MAE-final rise forms and their interactional functions will be further investigated in Sub-section 5.3.2.

Along with LINEARITY, physician YEARS IN PRACTICE are also positively correlated with MAE-final pitch slope. This result opposes the prediction made in **Hypothesis 19**, which associates rises with less experienced physicians (see 39). It also contradicts the overall finding that weak MAE features co-vary with one another and share social predictors, as strong structural features were more likely to be produced by professionally mature physicians (see Chapter 4).

Reversal of the primary social factor from my structural production study in the MAE-final pitch slope data, coupled with the fact that no structural features were retained in the model of MAE-final SLOPE, indicates that intonation functions separately from MAE-internal features. It is unclear from the quantitative analysis alone whether rising intonation is modulating MAE imperative force, or whether it is entirely pragmatically/ stylistically independent of MAE structure. The latter interpretation seems likelier, given that no structural MAE components correlated with pitch slope at all. Nonetheless, both possibilities are considered in the qualitative analysis presented in the next section.

Before shifting to an interactionally driven analysis, however, the social implications of the YEARS IN PRACTICE finding deserve further discussion. My judgment task results (see Section 3.3.4) showed that high rising terminals (HRTs) are perceived as uncertain and generally inappropriate when mapped onto MAE forms in physician speech. Assuming that the

MAE-final rises with high SLOPE and LINEARITY values observed in my production data are HRT-like, it is surprising that more experienced physicians would tend towards these forms. This association is particularly striking given that these same physicians appeared to be using strong structural MAE features as a cohesive class, constructing a uniformly authoritative-sounding MAE unit. One potential interpretation is that rises are being used to mitigate structurally strong forms, acting as a safeguard against sounding overly directive. Such as strategy seems counterintuitive, however, as HRT had the strongest negative connotations of any feature tested in my perception study. Rather than balancing the illocutionary and stylistic scales, the addition of HRT could easily tip the scales in the opposite direction, stripping an MAE token of its confident, trustworthy qualities. Another possibility is that physicians are backgrounding the attitudinal function of rising contours in favor of more textual functions. My judgment study did not elicit evaluations of such uses, as the rising and level intonation MAE items were presented as isolated forms. Textual uses may be perceived to be affectively neutral or even positive in the context of recommendation provision. They may indicate that additional explanation is forthcoming, offering a reassuring clue to the listener. As noted above, the direct relationship between pitch SLOPE and LINEARITY hints at a functional distinction, where the more extreme rises may actually be serving a textual function. If this is the case, more experienced physicians may be using rising intonation contours to hold the conversational floor or organize the discourse surrounding an MAE-type recommendation. To test this emergent hypothesis, MAE forms featuring rising final contours must be studied in context.

5.3.2 MAE pitch contours in interaction

Podesva (2007) suggests a link between pitch variation, expressivity, and identity construction, identifying falsetto and creak as two opposing extremes of voice quality that can be used to highlight their associated segments. In analyzing a student doctor's use of falsetto in physician-patient interaction (Heath, introduced in Section 2.4.1), he suggests that "Heath

may be taking advantage of falsetto's expressive connotations to assist him in nurturing or soothing [his] patient" (Podesva 2007:499). Applying this argumentation here, non-linear tokens may convey more expressive, affective rises based on their abruptly realized pitch contrasts. It may be the case that LINEARITY counterbalances physicians' more extreme MAE rises, allowing for textual uses that are less interactionally marked yet still perceptually salient. Moreover, given my quantitative finding that SLOPE is associated with physician YEARS IN PRACTICE, professionally mature physicians may be performing these affective rises differently from less experienced physicians. All of this is somewhat speculative, however, in the absence of qualitative analysis focused on individual tokens.

As described in Sub-section 5.2.2.2, I established a sub-sample of rises for qualitative review. In order to specifically investigate the differential use of rises by relatively experienced and inexperienced physicians, I divided this sub-sample into thirds based on physicians' YEARS IN PRACTICE. The three groups represented low, moderate, and high levels of experience. The subsequent Sub-sections, 5.3.2.1 and 5.3.2.2, describe findings from the low (N=40 tokens, physicians ranging from 2-16 years in practice) and high (N=40, physicians ranging from 24-42 years in practice) experience groups respectively.

Before contrasting physicians' rises based on their YEARS IN PRACTICE however, it is helpful to understand the basic categories for MAE-final rise function observed across the dataset. Three major functions were noted: TEXTUAL, AFFECTIVE, and ATTITUDINAL uses. Notably, a given token can be performing more than one of these functions simultaneously. For example, a rise may occur at the interface of two related utterances, while also collocating with patient-oriented, empathic-sounding MAE content. The former observation would suggest a TEXTUAL function (e.g., turn-holding or signaling continuation) and the latter would indicate an AFFECTIVE function (à la Podesva 2011). As articulated by Pichler (2010) with respect to discourse variables, multifunctionality presents a major challenge for researchers concerned with accountability and reliability. Primary functions can generally be deduced from context, but this process is inherently subjective. Speakers' interactional intentions can

never be ascertained with full confidence in post-hoc analysis. Thus it is important to bear in mind that the categories discussed here are well-motivated, but ultimately unquantifiable. With that caution made explicit, I will now characterize the three rise functions in turn.

The TEXTUAL function of MAE-final rises is one of elaboration and emphasis, consistent with Tyler's (2012) work on final rises more generally (see Section 2.4.1). Physicians' TEXTUAL rises link sequences of related utterances, signaling continuation to the listener. As such, these rises also serve to hold the conversational floor. They can also be emphatic when they co-occur with utterance-final stress. Consider the following example:

(43)   **Doctor**   Has she ever been tested to see the specific allergy that she has?

     Caregiver   Uh no.

     Doctor   Okay see those things are important and there's two ways that we can go about doing that because lots of it, you know from a medicine standpoint, is kind of dependent on what your symptoms are. Um I'm going to talk to you about what allergy is, is in just a second about what we are looking to actually treat. But the fact of the matter is **it's important to know what you have and also the severity of it too**. *Because if it shows that you're just allergic to spring time stuff, then okay you might just have to be on medicine a week or two before the season starts and stay on it for the spring and then stop it.* If it's showing something that you might be exposed to year round like dust mites or mold, different story that's like a whole year round thing. And you can do some preventative measures to prevent that specific allergen. You might be able to you know avoid being on any medicine for that matter too. So that's why these things are important, now there's two ways of testing you. One that we usually do here is we send off blood that we do through here, we send off values, we get results in three or four days, and it tells you not only the type of allergy but the severity of it too. Anywhere from class zero which is no allergy to class six, which is uh the highest. So if it showed that you had a class one to grass, not so upset about it, but if you don't treat the class five to dust mites yeah we've definitely got a major problem there. So those things are important.

(Verilogue 33473)

The bolded MAE in (43) is clearly related to the following, italicized utterance. The latter unit provides rationale for the recommendation given by the MAE form. The rise on *too* may be working to reinforce this relationship. Furthermore, it may be emphasizing a transition to talk that integrates the patient's allergy type and severity. The remainder of the physician's monologue builds on and reiterates this concept, as evinced by the underlined text. The MAE-final rise may also contribute to holding the floor for this monologic stretch of talk. Importantly, there is no indication that the rise is performing an AFFECTIVE or ATTITUDINAL function. The MAE form is composed of weak features to begin with, so an independent hedging function is unlikely. Moreover, the recommendation put forth by the MAE form is relatively unassuming, as it merely draws the patient and caregiver's attention to relevant information. It does not impinge on their autonomy in a meaningful way. For these reasons, it seems reasonable to assume that the MAE-final rise on *too* is primarily TEXTUAL.

Transitioning to the AFFECTIVE function, MAE-final rises can be used to mark concern or empathy. This is in line with Podesva's (2007, 2011) findings for Heath (see Section 2.4.1 and earlier in the current Section).[11] An AFFECTIVE use is demonstrated in (44).

(44)   **Doctor**   Let me just, uh, blood pressure though, that's what's uh, the boss. Your blood pressure is 150/100.

     Patient   That is a little high.

     Doctor   [...] That, that number warrants therapy, so you know, you're running, you're running, uh, bottom, even the top number is close, but the 150/100, but the bottom number warrants therapy. Um, and, um, you, you know, weight loss will help, obviously, avoiding any of the salty foods, whether the, whether it's, you know, whether it's made, whether it's cooking or you know.

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[11]EMPATHY did not produce significant results in my evaluation experiment (see Chapter 3), but this might have been due to the fact that the MAE forms in my judgement task were relatively decontextualized. Empathic meanings may be too situationally dependent to measure in abstraction.

Patient   Um-hum.

Doctor   Um, but this, um, this, you really, stay at this number, you need, you need treatment and the, the goal is to prevent heart disease.

Patient   Right.

Doctor   You know, sure.

Patient   Right.

Doctor   *Even though it's a pain in the butt being on medication, you need to control it.* And more commonly it's genetics, but, um, but you know, yeah. How, how's your weight? Is it up, down, same?

Patient   Uh, it's just been steady. I really haven't lost, uh, I maybe lost a couple pounds here and there, but not like, you know, big fluctuation.

Doctor   Um -

Patient   And I'm surprised because I'm usually doing something.

Doctor   Who's your primary doc, again?

Patient   [PHYSICIAN NAME OTHER].

Doctor   When was the last time you saw him or when are you scheduled?

Patient   Uh, I haven't seen him in a while.

Doctor   All right. So why don't you make an appointment? *You know, of course, this time of year, we need, we don't eat healthy this time of year. We, uh, we're not as active, but, but still, uh, you know, still, uh, a true part of the year of what it is, uh, it is what it is.* **So, uh, it is important to, uh, control that blood pressure**. So I, you know, I think you should get in there within the next week or two, time to make it before Christmas, let him check your pressure -

(Verilogue 60084)

Here, a physician is expressing concern over the patient's in-office blood pressure reading and outlining a plan for blood pressure management. In the bolded MAE utterance, the

final rise on *pressure* could be playing a continuation-type textual role, but evidence from the preceding dialogue points to a primarily empathic function. After alluding to worries about the patient's long-term cardiovascular health, the physician provides two options for treatment. First he presents pharmaceutical measures, admitting that they are a nuisance, but a necessary one (see italicized text). Next, he shifts to weight loss, once again acknowledging the difficulty that the patient might have following through with a diet plan in the current *time of year*. Both of these gestures indicate attention to the patient's perspective. They build to the MAE-form recommendation, which reinforces the need for blood pressure control despite the likely inconvenience of proper management. The MAE-final rise may be one additional way for the physician to indicate solidarity with the patient, even though he is ultimately recommending that the patient change his behaviors. It is AFFECTIVE insomuch as it supports the physician's efforts to position himself with the patient, displaying respect for the patient's priorities along with concern for his/ her welfare.

Finally, the ATTITUDINAL function attenuates the strength or specificity of a claim, acting as a hedge-like device. This is illustrated in (45), where a physician uses an MAE-final rise to de-emphasize his patient's stigmatized mental health condition.

(45) **Doctor** Okay. Any, any at all, kind of, flashes or periods of breakthrough symptoms at all, intrusive thoughts or anything that kind of seems unusual, or -

Patient I don't think so.

Doctor Okay, okay, good. Do, do you think things, you know, I mean, are, no real-

Caregiver Huh-uh.

Doctor Nothing that you've noticed of concern, or -

Caregiver Huh-uh.

Doctor Good, I mean, I know we talked about this last time, and it's been quite a while since now, we've made changes in terms of things, but I guess I just continue to be encouraged by, um, his-

Caregiver *Yeah, the only time, that one time you maybe weren't getting your rest, and he was describing it as a little bit excited, and that you said that it was just maybe a little bit too much on you.*

Patient Yeah.

Caregiver *So, I think you have to back off then-*

Doctor Yeah.

Caregiver *Just to make sure you get your rest, and-*

Doctor Yeah.

Caregiver *Don't get drawn into something that-*

Doctor Yeah.

Caregiver *Is going to keep you up at night, you know,* [LAUGHING].

Doctor Yeah, no, and you're right, and I think again in, the reality is that sure, with illness, I think **it's even more important to be aware of that**. But I think truly from just that broader sense of feeling decent and feeling well, that, really-

Patient [LAUGHING].

Doctor It applies to all of us, and, and, uh, you know, it's, we, we, uh, I think the older we get, the less we tolerate those disruptions, too, from even a non kind of medical perspective, too. So, I think it's somehow, the, the good news is we correspondently increase our wisdom to be able to look at it and say, "boy, I got to get back and just take care of myself and get back into a routine".

(Verilogue 32875)

The patient in (45) has been diagnosed with and treated for schizophrenia. His degree of symptom control is being assessed with the intent of adjusting his treatment regimen if necessary. After the patient denies having any recent issues, his caregiver interrupts to report episodes of being *a little bit excited* (see the italicized text in 45). She provides a series of directives for the patient, telling him to *back off* and *get rest* when he becomes agitated.

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These recommendations take a condescending tone as the caregiver positions herself as an authority on the patient's care. This creates a potentially face threatening situation for the patient (à la Brown & Levinson 1987) as his autonomy is being encroached upon and his abnormal, pathologized status is being highlighted. The physician supports the caregiver by saying *you're right* and offering the bolded MAE-style recommendation with respect to the patient's illness. In doing so, however, he is also sensitive to the patient's face needs. After acknowledging the disease-focal implications of the patient's sleep schedule, he broadens the discussion to *all of us* and *feeling decent* in a general sense. These phrases counter the pathologizing effects of the preceding discourse, normalizing the patient's experiences. The MAE-final rise on *that* reinforces these efforts. It draws on MAE's connotations of uncertainty to soften the physician's recommendation, working in concert with the physician's epistemic hedges (i.e., *I think*) to mitigate the threatening aspect of his overall stance. Again, the ATTITUDINAL function of the physician's MAE final rise does not exclude the possibility of a TEXTUAL use, but in the context of the surrounding discourse, the stance-modifying purpose appears to take precedence.

Having detailed the functions of TEXTUAL, AFFECTIVE, and ATTITUDINAL MAE-final rises, the following Sub-sections explore the particular ways in which high and low experience physicians (as defined by their YEARS IN PRACTICE) utilize rises to construct distinct interactional styles.

5.3.2.1 MAE-final rises from inexperienced physicians

The MAE-final rises of less experienced physicians were distinguished from those of more experienced physicians by their predominance of ATTITUDINAL functions. Though a rigorous quantification could not be undertaken for the reasons mentioned above, such uses were characteristic of the younger sub-sample and rare in the older sub-sample. Their affective interpretations were supported by collocated epistemic markers as well as the content of the MAE and the surrounding dialogue. The rises in these AFFECTIVE cases exhibited HRT-like

(H*⁻H%) or fall-rise (L*⁻H%) patterns with abrupt changes in pitch. Examples (46) and (47), provided below as transcripts and MAE-specific pitch tracks, are representative.

(46) **Doctor**   Um, you'll not hear in a radiation oncologist say what I'm going to say next because they don't directly deal with this. *And I can't give you, uh, numbers to say what these percentage are, occasionally, however, and a person will have fairly awful side effects from radiation.* The awful side effects usually are, um, bleeding from the bladder. [...] And as a person gets older all their tissues will get older. In our practice, we will remove two or three bladders per year for men with a late devastating effects of radiation. *Believe me, this is something, that is the last tool in our toolbox.* But and this is a situation when, believe me, we don't rush to do that. But I don't want to overemphasize that, but I think **it's very important that a person realize that that is a small, certainly low single digit percentage, but that is possible**. And it's not just in the radiation, from the radiation, in the older days of radiation when it was a much cruder form of radiation, we saw it more often. But we're still seeing it now from men who are having the, what's called a conformal radiation or the IMRT, the intensity modulated radiotherapy. We are still seeing it.

(Verilogue 8819)

Example (46) features an oncologist and elderly male patient with prostate cancer. The oncologist is explaining post-surgical treatment options. More specifically, he is outlining the more serious adverse effects of local radiation. Prior to the bolded MAE token, in the italicized text, he is emphasizing that these effects are uncommon, but severe. He is attempting to strike a balance between adequately informing the patient and alarming him unnecessarily, using *occasionally* and *last* to stress the rarity of these events. This interplay is further evident in the MAE token itself, where weak and strong features are combined to create a kind of pragmatic tension. An intensifier (*very*) is added to a strong, finite complement, giving a sense of urgency. This urgency is countered however by the use of an impersonal modal agent (*a person*) and a mental verb (*realize*). The MAE-final rise
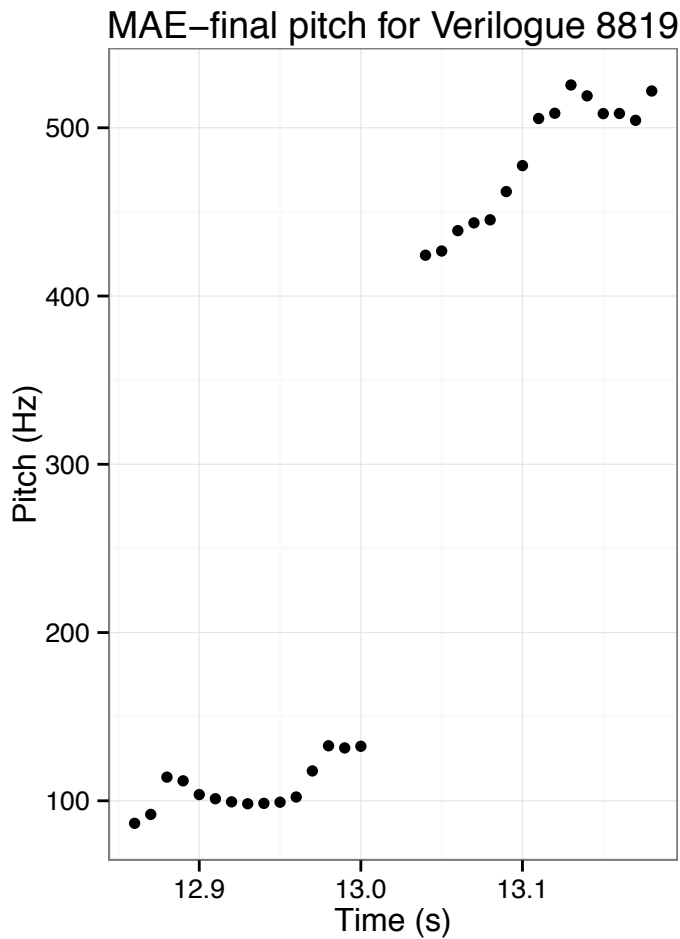
Figure 5.3 Individual pitch measurements for a single MAE-final rise token (Verilogue 8819, see 46) on the word *possible*.

may be part of the latter, mitigating feature cluster, adding a connotation of uncertainty that resonates with the previous, italicized utterances.[12] Figure 5.3 illustrates the form of this rise. It is a dramatic discontinuity whose apparent phonetic salience is corroborated by auditory analysis. Overall, the MAE token in (46) projects tentativeness. This tentativeness may be specific to the interactional task at hand; namely, conveying information that is

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[12]The uncertainty conveyed by this rise does not modify the propositional content of the MAE token, which is merely asking the patient to attend to potential adverse effects. Instead, the uncertainty is applying to the possibility of experiencing said effects. This further suggests that intonation has a relatively independent, contextually derived effect on MAE constructions.

inherently uncertain. Alternatively, it may reflect on the physician's professional character as an inexperienced practitioner.

(47)   **Patient**   Um, what are the main side effects for that?

      Doctor   Um -

      Patient   Because sometimes I, *you gain weight*, you get -

      Doctor   Yeah, well, this, this one is not, weight neutral so you shouldn't gain any weight, <u>that's why I like it</u>.

      Patient   Is it? Yeah.

      Doctor   I use it a lot just because **it's very important not to gain weight especially for females-**

      Patient   Right, right.

      Doctor   Because if you gain weight, you're going to be getting more -

      Patient   Right, more depressed. (Verilogue 11504)

In contrast to the previous example, (47) deals with a different kind of hedge-like ATTI-TUDINAL function. Here, a male physician is considering a new class of anti-depressant for a female patient. She expresses concern about weight gain (italicized), which he addresses. In doing so, he explicitly states that weight neutrality is part of his rationale for selecting this particular medication (see underlined text), a preference that is further specified in the context of the subsequent MAE token. The MAE token is a generic recommendation against weight gain *for females*. By directing the recommendation—which applies to both sexes—towards *females*, he makes a gendered claim about the importance of weight. This stance may be face-threatening to the patient in that it suggests she (as a female) may be especially sensitive to weight issues. Though the MAE-final rise on *females* may very well be connecting the physician's recommendation to additional explanation in his subsequent turn, it has the primary effect of countering the potential face-threat resulting from a gendered stance in a gender mis-matched interaction. In other words, the rise acknowledges the

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Figure 5.4 Individual pitch measurements for a single MAE-final rise token (Verilogue 11504, see 47) on the word *females.*

physician's lack of first hand experience with the female role while attending to the patient's face needs.

Like in (46), the rise in (47) occurs on a mixed-force MAE token. A strong intensifier is present with a strong, action verb predicate, but the complement type is a weak, infinitival with an impersonal modal agent. Thus, once again, an ATTITUDINAL rise is contributing to pragmatic tension. The form of the rise in (47), shown in Figure 5.4 is also similar to that of (46) (see Figure 5.3), though the rise occurs later in the word (starting on the latter half of [eɪ] in *females*). It is both phonetically and perceptually salient. As such, the MAE-

final rise in (47) seems to be performing interpersonal work. It is contributing to negative politeness within the MAE token, while also helping to organize the surrounding discourse. Though it involves stance mitigation like the preceding example, the stance being modified is interpersonal rather than epistemic. It is still possible that a patient might still interpret this as sounding relatively unsure, but such an interpretation seems less likely than in the previous case.

Before turning to MAE-final rises in professionally mature physicians' speech, inexperienced physicians' use of AFFECTIVE rises deserves some attention. Though physicians in both professional age categories used these types of rises, the ones produced by young physicians were most akin to Heath's utterance-final rises in Podesva's (2011) data. They seemed to help construct the same "caring doctor" persona highlighted in Heath's physician-patient interactions. Consider the following example with its respective MAE token bolded:

(48) **Doctor**   All right, and how about, are you getting, uh, plain fluids about 100 ounces a day?

      Patient   Yes. I know you probably mean water, right? I'm drinking more -

      Doctor   Um, actually anything uncaffeinated. So, Propel, Crystal Light, um, Gatorade, um, Powerade -

      Patient   Okay.

      Doctor   Any of those count.

      Patient   *I'll, I'll start drinking more of that.*

      Doctor   Okay, because if you're, if you're, this medication dehydrates you like crazy. So, **it's really important that you get all your fluids**. All right, let me just take a listen to you here. Okay. Deep breath in and out. Again. Good. Okay. I'm going to have you lay back here and we'll check your belly real quick. Okay. I mean you're tolerating this treatment very well. That's great.

      (Verilogue 42580)

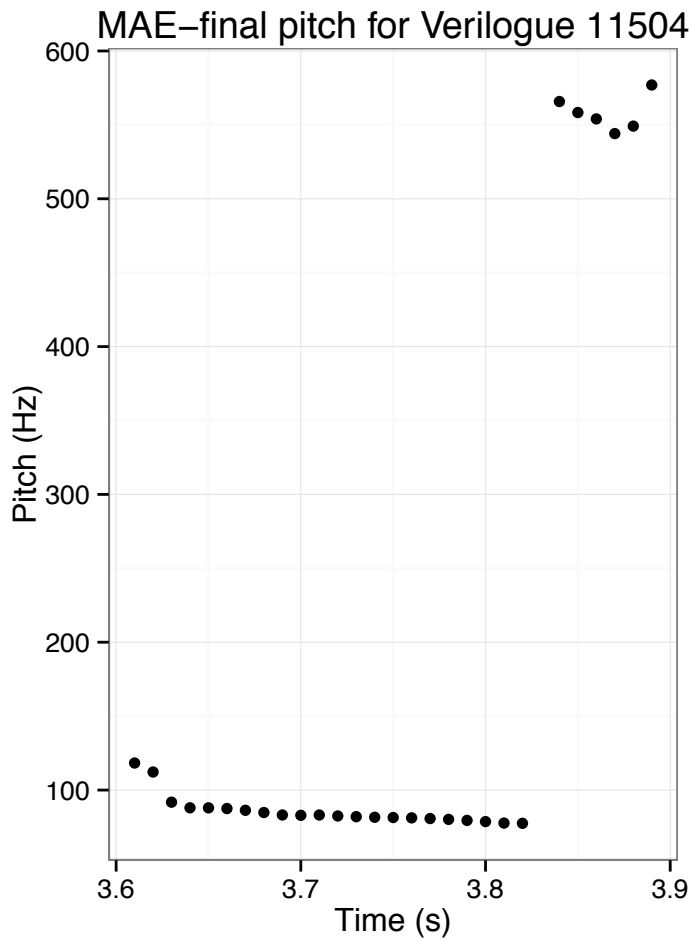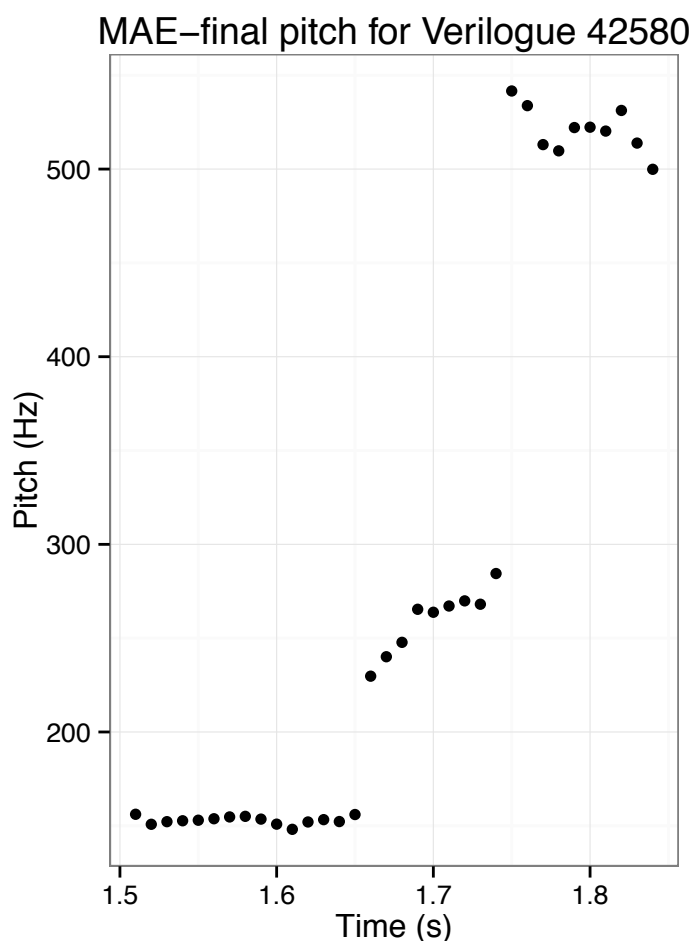Figure 5.5 Individual pitch measurements for a single MAE-final rise token (Verilogue 42580, see 48) on the word *fluids*.

The rise on *fluids* in (48) is probably not performing a primary TEXTUAL function, given that it precedes a transition into the physical exam portion of the visit. It cannot be indicating elaboration or continuation in this position. Instead, the antecedent context alludes to a an AFFECTIVE function. In the patient's prior turn, she admits to not drinking an adequate volume of plain fluids (see italics) relative to the indications of her treatment plan. The physician shows concern for this behavior, explaining that the patient's medication has a diuretic effect. She goes on to underline the importance of drinking fluids with an MAE-style recommendation. This recommendation is cohesively strong. It does not demonstrate the

pragmatic tension of weak and strong features seen in the ATTITUDINAL examples. Here, the MAE-final rise does not appear to be hedging the recommendation. Rather than marking epistemic or interpersonal uncertainty, it seems to be expressing affiliation and support, or as Podesva puts it "nurturing" (2007:499). The physician is attempting to position herself in a coach-like role, enhancing her authoritative-sounding recommendation with notes of empathic encouragement. The phonetic salience of the physician's rise (see Figure 5.5) corroborates this hearer-oriented interpretation. It has an obvious HRT-like contour, again likening it to Podesva's data.

5.3.2.2 MAE-final rises from professionally mature physicians

The MAE-final rises observed in the speech of professionally mature physicians, those with above average YEARS IN PRACTICE, generally demonstrated primary TEXTUAL functions. Since TEXTUAL functions can be attributed to most MAE-final rises, one might also point to a relative lack of evidence for AFFECTIVE or ATTITUDINAL uses in the older sub-sample. In fact, ATTITUDINAL uses were remarkably absent in comparison to the younger group. That being said, TEXTUAL rises were not identified as a default function—as with AFFECTIVE and ATTITUDINAL uses, they had characteristic forms and discourse collocates. TEXTUAL rises tended to be accomplished largely through boundary tones (H%) without prominent final pitch events. Moreover, they were often followed by clause initial connectives/ discourse markers such as *and*, *but*, and *so*. Examples (49) and (50) are given along with their pitch tracks to illustrate broader patterns in the experienced physician group.

(49) **Patient** Well, you know, I haven't got all the money in the world, you well know [IN-AUDIBLE], *if some of this other frou frou would eliminate, would cut the cost of this administry.*

Doctor I hope it will. Let me talk to her and see what we can do. Okay?

Patient Because I, it shocked me a little bit.

Doctor How much was it?

Patient   Three hundred and something dollars, I guess, and then had a lot of stuff written on the top, I didn't understand.

Doctor   Right, right.

Patient   And, uh -

Doctor   So, it's $300.00 a month?

Patient   Uh, no, it was for this period, well, [INAUDIBLE] months.

Doctor   Okay.

Patient   It was this period of time that I-

Doctor   But it's been, you know, [PATIENT NAME], **it's so important for you to take the medicines the way I prescribe it for you**.

Patient   Yes.

Doctor   And, and, sometimes as people get older, their memory is not as good as it was when they were younger -

Patient   Um-hum.

Doctor   And then the medications, if you take the medicines wrong, you could end up in the hospital -

Patient   Yeah.

(Verilogue 60628)

(49) specifically demonstrates a turn-holding TEXTUAL MAE-final rise. In this excerpt, the physician is interacting with a cognitively impaired patient. She frequently interrupts him with off-topic or nonsensical interjections. One such utterance is italicized, where the patient refers to unspecified *frou frou* out of the blue. She is unable to provide details with respect to her concern in response to the physician's questioning. Finally, he interrupts her underlined utterance with an MAE token. In this token, he introduces the new topic of careful medication use. The MAE-final rise on *you* maintains the floor while allowing him to continue to build a case for treatment plan adherence. The physician's subsequent utterances

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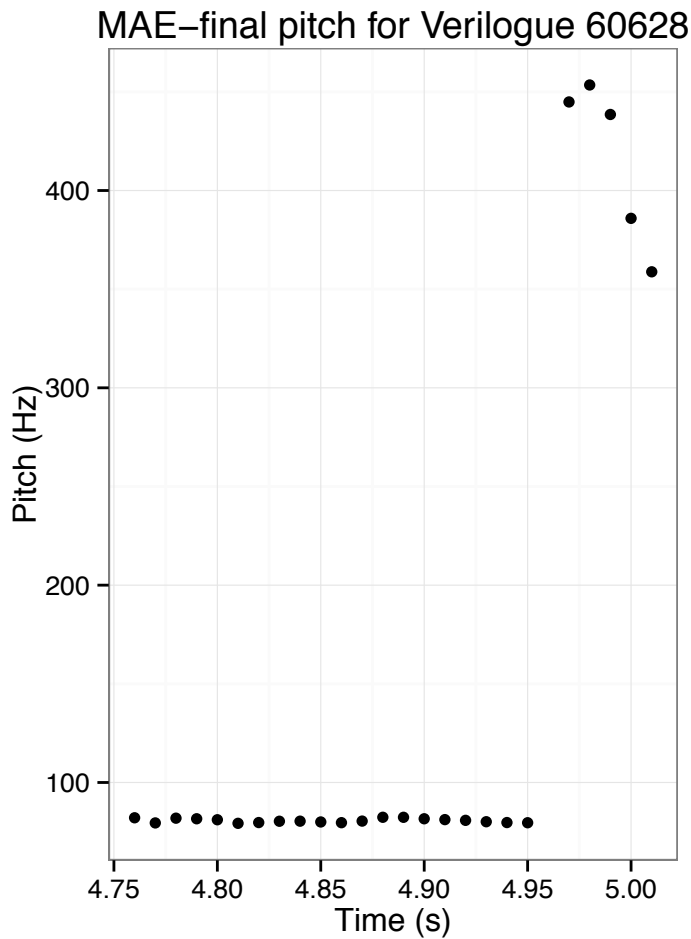
Figure 5.6 Individual pitch measurements for a single MAE-final rise token (Verilogue 60628, see 49) on the word *you*.

bring in potential affective and attitudinal content, but when the MAE-style recommendation is introduced, the patient's cognitive state and potential difficulties taking medications have yet to be explicitly addressed. These later utterances are presented with clause-initial *and*, suggesting that the MAE-final rise is signaling elaboration and continuation. As shown in Figure 5.6, *you* is level until the final milliseconds of the vowel. This additionally supports a primarily TEXTUAL function, as the rise appears to be a H% interfacing between two adjacent clauses.

(50)   **Patient**   Okay and, uh, what's the other thing, the triglyceride stuff, see if this -

Doctor   *See if the Tricor is helping you.*

Patient   *Tricor's working, all right*

Doctor   Okay, sounds good to me.

Patient   When should I call you?

Doctor   Well, we're going to draw the sugar today, what's today?

Patient   Thursday, [DATE].

Doctor   Call me Monday morning.

Patient   Monday, okay.

Doctor   I should have it on Monday morning -

Patient   All right.

Doctor   But you, you know, **it's really important to watch your diet**. I think that's the big thing here, you know, your lifestyle is not conducive to being a diabetic.

Patient   [LAUGHING].

Doctor   [LAUGHING].

Patient   I definitely have dessert at every party.

(Verilogue 28393)

(50) exemplifies another type of TEXTUAL function, where an MAE-final rise provides contrast along with an indication of related content to follow. In this dialogue, the physician and patient are reviewing the patient's treatment plans for hypercholesterolemia and diabetes. They have a thorough conversation about pharmaceutical interventions, a portion of which is italicized, and move to an aside regarding blood work. At this point, the physician brings up diet using an MAE form. Diet, a lifestyle intervention, is being contrasted with the previously discussed pharmaceutical interventions. Figure 5.7 shows that *diet* is stressed, as evinced by its subtle rise-fall contour.[13] The prosodic stress on *diet* combined with the

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[13]Though Figure 5.7 does not demonstrate it, *diet* in (50) also bears an intensity peak, further indicating prosodic stress.
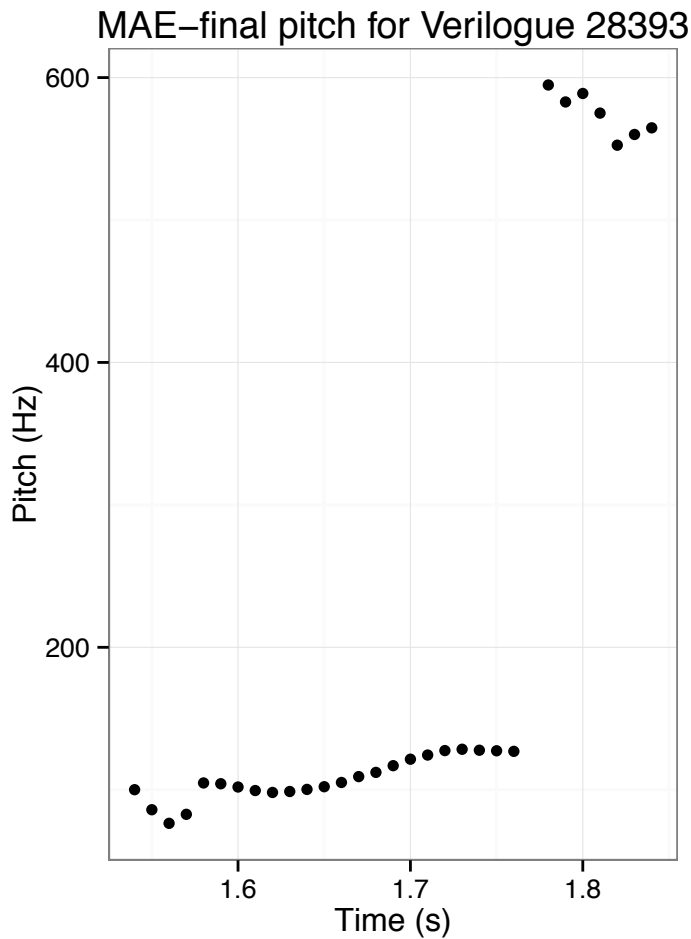
Figure 5.7 Individual pitch measurements for a single MAE-final rise token (Verilogue 28393, see 50) on the word *diet*.

MAE token's position in the discourse points to an emphatic use of *diet*'s final rise. The rise supports contrastive focus on *diet* while also connecting the MAE token to the subsequent, related physician utterance. As always, AFFECTIVE and ATTITUDINAL interpretations are possible, but the dual TEXTUAL purposes of this token suggest a primary TEXTUAL function, especially in the absence of compelling evidence for an AFFECTIVE or ATTITUDINAL purpose.

AFFECTIVE functions are present in the experienced physician data, though they differ somewhat from the AFFECTIVE tokens characterized in the early career physician sample.

When produced by professionally mature physicians, AFFECTIVE rises are typically coupled with direct references to the consequences of non-compliance and other indices of physician authority. An example of this seemingly paternalistic context affective rises is given in (51).

(51)   **Doctor**   Are you taking your multivitamin?

      Patient   Uh-huh.

      Doctor   Are you taking the vitamin D with calcium?

      Patient   Uh-huh.

      Doctor   Are you taking folic acid?

      Patient   *When I remember to do it.*

      Doctor   **Well, it's important you take it every day <u>if you want to prevent any more bone problems</u>**. Okay and then you're still living at home with your husband, right?

      (Verilogue 10791)

The MAE token in (51) occurs immediately before a topic transition, again ruling out the possibility of an elaborative TEXTUAL use. In similar form to (48), it is also preceded by a patient's admission of non-adherence to her treatment plan and composed of mostly strong, structural MAE features. However, unlike (48), (51) is further specified by a threat of clinical deterioration. Furthermore, this potential future (underlined above) is attributed to the patient's actions. By drawing an association between the patient's actions and an adverse outcome, the physician creates a condescending, accusatory tone that further emphasizes her authority in the visit. In this context, the MAE-final rise on *problems* has a patronizing flavor, despite its caring connotations. Though experienced physicians are assuredly capable of purely nurturing, supportive rises, the data indicate that such rises may be more characteristic of young physicians.

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5.4 Summary

The current Chapter made predictions with respect to physicians' production of rising intonational contours on MAE tokens and used a mixed method approach to test these hypotheses. The principal goal of this exercise was to assess the generalizability of my findings from Chapter 4. More specifically, I sought to test whether a non-integral, "hitchhiker" variable behaved like structurallly variable MAE features, co-varying in terms of pragmatic strength and social constraints. I also attempted to further investigate physicians' stylistic manipulation of MAE features, targeting the interaction of structural and supra-segmental identity work. To this end, I combined qualitative and quantitative methods in my study of MAE-associated intonation contours. I created a sample of high quality audio clips from the production sample generated in Chapter 4, eliminating tokens for which automated acoustic analysis would be impossible or inaccurate. I extracted the word-final pitch slopes for all of the tokens in this sample. I then performed a multiple regression analysis predicting continuous pitch slope variation as a function of MAE structure and social factors. Additionally, I selected a group of positive slope, rising intonation tokens for in-depth qualitative analysis. The following summary integrates my findings from both the quantitative and qualitative analyses and assesses their implications with regard to my original objectives.

The hypotheses in (38-42) were largely unsupported in my results. Rising intonation did not correlate with weak structural features on a quantitatively significant level. Qualitatively, rises tended to collocate with mixed or strong MAE tokens, suggesting an inconsistent modulatory role. Perhaps more impressively though, MAE-final rises were significantly correlated with increasing physician YEARS IN PRACTICE. This finding diametrically opposes the prediction in **Hypothesis 19** and the trend observed for strong COMPLEMENT TYPE in Chapter 4. My hypothesis was that MAE-final rises would be avoided by more experienced physicians due to their associations with uncertainty, a prediction that was supported by older physicians' preference for strong forms in my structurally focused study. Considered

together, the lack of structural predictors for MAE-final rises and the conflicting YEARS IN PRACTICE result provide convincing evidence against the proposal that structural and supra-segmental features pragmatically/ stylistically co-vary in physicians' MAE constructions. Despite traveling on MAE constructions, hitchhiking final rises do not seem to follow the lead of their MAE-form hosts.

Returning to the social implications of the association between MAE-final rises and increasing physician YEARS IN PRACTICE, further analysis demonstrated that rises were serving different functions across the professional age spectrum. This functional disparity was alluded to by LINEARITY's role in predicting increasing MAE-final pitch slopes. As pitch slopes became more positive and more pronounced, they also become more regularly linear, suggesting a perceptual distinction between slight and extreme rises. Qualitative analysis corroborated and further developed this pattern. Inexperienced physicians' rises were characteristically ATTITUDINAL, serving interpersonal or epistemic stance modulating functions. Professionally younger physicians also produced empathic AFFECTIVE rises indicative of the "caring doctor" persona proposed by Podesva (2007, 2011). By contrast, more experienced physicians primarily used MAE-final rises for TEXTUAL purposes. These rises conveyed contrast, positioned MAE tokens with respect to following utterances, and held the floor for multi-utterance turns. Though professionally mature physicians also used AFFECTIVE MAE-final rises, they did so in the context of an exaggerated authoritative style. In this environment, rises contributed to a paternalistic tone.

Thus, though intonation does not participate in the pragmatic and stylistic concord observed in Chapter 4, it supports an overall trend towards increasing use of authoritative recommendation styles over physicians' professional lifespans. It shows that linguistically distinct MAE-associated features are still subject to the socialization pressures pushing physicians to sound more confident over time.

Chapter 6

Synthesis and implications

"No one explained what we might feel or see, and—perhaps most important—no one told us how a physician learns to set aside a lifetime of human interaction and socialization in the blink of an eye in order to become a professional. No one ever told us how we might transform our social, human selves into our doctor selves."

(Newman 2008:85)

In this dissertation, I have examined the use of a particular semi-modal deontic form, mandative adjective extraposition (MAE), as employed in physicians' in-office interactions. MAE was selected as a well-circumscribed variable exemplifying one of the many potential forms functioning within the act of recommending, whereby physicians present stances with respect to medical advice. I have investigated variation in MAE's component features—as well as one of its coincident ones—for the purpose of determining MAE's contribution to physicians' recommendation styles. I have argued that this variability has both medical and linguistic consequences. For sociolinguistics, treating style as the co-variation or clustering (cf. Podesva 2008) of similarly valued features within a single construction provides a new perspective on the relationship between linguistic structure and social identity construction. For medicine, the identities constructed by means of MAE's variability represent one small yet interactionally significant piece of physicians' communicative repertoire. Collectively, this study demonstrates ways in which physicians' recommendation styles reflect and reinforce their professional identities. It shows that physicians' sociolinguistic behavior in physician-patient interaction is fundamentally related to their practice of medicine. Furthermore, it suggests that physicians' use of medically significant variables evolves as they gain experi-

ence in practice, that they "transform [their] social, human selves into [their] doctor selves" (Newman 2008:85) in the context of patient interaction.

Through the process of discerning the linguistic and social influences on physicians' MAE production, this study introduces several novel observations and theoretical constructs pertaining to the intersection of language use and social practice. The following Sections describe the primary contributions of this work in turn, summarizing its major findings while also highlighting the ways in which these results further the cross-disciplinary study of variation in medicine.

6.1   MAE as an institutional and interpersonal resource

Prior to deriving generalizations for physicians' MAE use, it is worthwhile to consider the distribution of MAE variants and features in physician speech. My production findings indicate that physicians use different importance-type MAE forms with drastically disparate frequencies. Forms involving the adjective *important* account for over ninety percent of the MAE tokens in my sample, dwarfing all of the other importance-type MAE forms combined. Furthermore, focusing on MAEs featuring *important* as their adjective of importance, infinitival, non-intensified, and impersonal forms consistently outnumber their respective alternatives, constituting the majority of tokens in each of the five samples considered in Chapter 4. Based on my perception data, infinitival, non-intensified, and impersonal forms index relatively weak obligatory force as a part of the weak variant class. In other words, they are the most conservative options to choose from in a situation where deontic MAE is appropriate.[1] In my evaluation study (Chapter 3), these weak forms were found to index a relative lack of provider confidence and trustworthiness. Rising intonation was additionally determined to be less empathic sounding than other forms. Thus it seems that forms indexing less positive

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[1]When contextualized with respect to Van linden and Davidse's (2009) data, the medical distribution of MAE seems to be somewhat distinctive, as their non-institutional dataset does not show such a dramatic predilection for weak forms.

or frankly negative physician traits are still used quite frequently in production. This raises a simple but ultimately nuanced question: why do physicians use and sometimes prefer weak MAE forms when patients value strong forms?

One potential explanation for this finding is an exaggerated interpersonal drive towards indirectness in institutional talk. Previous work has suggested that this pressure can impose strong social influences on pragmatically constrained variation. For example, Hasty et al. (2012) observe that Southern US English-speaking physicians use double modals (e.g. *You might could try changing your diet*), a non-standard politeness marker, in ways that could not be predicted by their demographics alone. They claim that double modals serve as a particularly valuable hedge in medical talk, lessening the social stigma surrounding this form for well-educated and female speakers. Extending this reasoning, physicians' preference for weaker MAE forms may reflect their clear motivations to respect politeness constraints, where indirectness may allow for more substantive patient contributions to the interaction. Positive patient health outcomes have been repeatedly associated with physicians' willingness to prioritize patients' concerns and to demonstrate interest in the patients' agendas (Stewart 1995). Some of this attention to patient needs is accomplished sociolinguistically. By avoiding face-threatening acts (Brown & Levinson 1987), physicians preserve patients' identity, building rapport and promoting a positive physician-patient relationship. This interpersonally sensitive behavior may be especially important in the case of recommendations, where the very act of recommending imposes on patient autonomy (Robins & Wolf 1988). Physicians may be motivated to hedge recommendations based on the desire to maintain a supportive doctor-patient dynamic. Weak MAE forms allow physicians to balance this goal with a need to convey some degree of obligation, an institutional task required of the physician role (Gwyn & Elwyn 1999).

Physicians' disproportionate use of weak MAE forms might also be explained by intra-personally motivated, epistemic hedging. Physicians may wish to avoid making strong, 'on record' claims that involve some degree of inherent medical uncertainty. This proposal is

supported by Gordon et al's (2000) finding that physicians make direct reference to uncertainty in the majority of consultations through the use of epistemic hedges such as *I don't know* and *it is not clear*. Though weak MAEs are not direct expressions of uncertainty, they present relatively hedged stances when compared to strong MAE forms. My qualitative analysis indicates that rising intonational contours, the weakest of potential MAE features based on participant ratings, co-occur with uncertainty markers in physician speech. These rises are characteristic of inexperienced physicians, physicians for whom factual or interactional uncertainty may be a relatively common occurrence. In a situation of legitimate medical uncertainty, it may not be desirable to sound confident and/ or trustworthy.[2] Such stances might even be interpreted as inappropriate or disingenuous. Even in the event that these physicians are certain of the medical knowledge underlying their recommendations, however, they may be less practiced in the art of conveying a given stance. Weak MAE may serve as a resource for physicians needing to present a stance on which they are hesitant or to which they wish to remain noncommittal.

Lastly, physicians' use of weak forms may represent a form of affective interpersonal work intended to intersubjectively acknowledge patient emotions. Though my perception data does not demonstrate explicitly empathic or open-ended associations for weak MAE forms, these negative results may be an artifact of my task, which presented MAE forms outside of their interactional context. When I considered contextual effects in my qualitative analysis, seemingly empathic uses emerged, demonstrating an affective function for MAE-final rises across the spectrum of physician experience. In these scenarios, physicians were compelled to make a recommendation that the patient would likely find difficult, either in the practical or emotional sense. Here, a weak feature acted to attenuate the asymme-

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[2]Physicians have many compelling reasons to express uncertainty in medical consultations. They may do so due to a lack of personal confidence, a drive to avoid potentially actionable statements (in a legal sense), or personal attitudes towards the physician role and/ or the nature of medical decision-making. This non-exhaustive list of potential mediators highlights the sociolinguistic complexity of stance-taking in physician-patient communication, a rich topic for future qualitative research.

try of the exchange, symbolically yielding interactional authority by understating physician confidence and backgrounding the physician's expert identity. Commenting specifically on intonation, Podesva characterized this behavior as a "nurturing" (2007:499) use of sociolinguistic variation, one that may construct a "caring doctor persona" (2011:246). Though the caring doctor persona may not be as salient as the authoritative (confident and trustworthy) persona for MAE, physicians still perform soothing, empathic identities in the context of recommendations. They may just be less cohesive in terms of feature clustering and/ or less appreciable from the perspective of the patient.

6.2 MAE as a site for pragmatic and stylistic co-variation

Both my perception and production studies provide evidence in favor of co-variation within MAE forms. That is, listeners tend to perceive and speakers tend to produce MAE's feature variants as classes, cohesive groupings distinguished on a continuum of obligatory force. As a whole, feature variants can be described as more or less compelling, more or less forceful in the illocutionary sense. This suggests that MAE can be characterized as a structure made of discrete yet interconnected pragmatic building blocks, where each feature contributes some degree of obligatory force that is determined by its independent identity as well as its relation to other features. 'Strong' and 'weak' feature variants cluster together (cf. Podesva 2008), constructing MAEs that are emergent representations of their shared interpretation. Furthermore, MAE's contrastive pragmatic interpretations are socially evaluated. As noted above, clusters of strong features uniformly project confidence and trustworthiness, providing resources for physicians' performance of an expert persona in the physician-patient visit—one that is authoritative, firm yet reassuring. To the extent that MAE's variant classes contribute highly salient flares of authoritativeness through their patterned collocation, they typify Eckert's (2013) stylistic constructions, "combinations of features whose function is more than the sum of its parts". This label points to a more fundamental aspect of MAE's pragmatically and stylistically significant co-variation. MAE's feature collocations are not unorganized

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coincidences in the discourse. Insomuch as MAE, a discrete syntactic construction, can be thought of as a regular arrangement of grammatical slots, it is also a a stylistic blueprint for speakers building a stylistically meaningful recommendation.

Despite consistently demonstrating patterned co-variation of MAE's inherent structural features, my study also shows that rising intonation, a superimposed variant on top of MAE's semantic and syntactic elements, does not contribute to MAE's pragmatic and stylistic coherence. To the contrary it often actively opposes the strong or weak character of an underlying MAE structure. Thus it seems that intonation, one of Mendoza Denton's (2011) semiotic hitchhikers, is not merely along for the ride. It adds textual, attitudinal, and/ or affective character to MAE, modulating MAE's obligatory force and linking it to functionally related utterances in the discourse. While physicians' manipulation of MAE structure constructs degrees of authoritativeness in patient consultations, rising intonation contours highlight dimensions of their expert identity. In its textual function, rising intonation organizes speakers' claims, connecting recommendations with their respective rationales, accentuating their competence. Attitudinal uses serve the opposite function: they downplay speakers' commitment to a recommendation, leaving it open for negotiation or later amendment. Perhaps counterintuitively, this is also a mark of expertise in that it presents a measured confidence commensurate with ever-present uncertainty in the practice of medicine. Similarly, affective contours de-emphasize physicians' expert authority in order to put patients at ease. This empathic function overlays a "caring doctor persona" (Podesva 2011:246) on an authoritative act, creating another layer of interactional meaning on the base structure of MAE.

In the sense that meaning can be layered onto MAE forms, building additions onto an already interpretable pragmatic and stylistic structure, the greater linguistic environment of MAE can be regarded as a site of pragmatic and stylistic bricolage (à la Hebdige 1979, cf. Eckert 2008). Distinct, potentially varied layers of meaning can be assembled through the superimposition of suprasegmental processes on structural ones. The synergistic result is a complex interactional object that can be collectively evaluated and further integrated into

discourse-level processes.

6.3   MAE as an indicator of physicians' community structure

This dissertation also presents observations with regard to physicians' collective behavior as a professional, practice-based sociolinguistic community. The most basic of these findings is possibly the most striking one: physicians across the US, practicing in a variety of settings, appear to share social constraints on MAE use. That is to say, despite a lack of direct contact, physicians appear to share sufficient behaviors, goals, and ideologies to create remarkable, nation- and profession-wide consistency in their use of MAE.

More specifically, physicians' intra-professional constraints on MAE use are highly suggestive of participation in a Community of Practice (CoP). As stated in Chapter 2, a CoP is defined as a group of speakers who mutually engage in social behaviors, sharing similar goals, means, and assumptions (Eckert & McConnell-Ginet 1992; Wenger 1998; Meyerhoff 2002). Within the frame of an institution such as medicine, this shared social framework is formalized into professional expectations and requirements. Physicians select their own members and train them both explicitly and implicitly to represent the values of the profession. They teach them to see cues and experience interaction through the physician's lens. This new perspective gives everything a new interpretation—purple tinged lips are now cyanosis, swollen feet are now signs of heart disease, job loss is now a risk factor for a mood disturbance, etc.—such that it would be rather unexpected if sociolinguistic variation were somehow excepted from this process. Physicians' ideological foundations, perpetuated through training and mentorship, form a culture of medical practitioners with distinctive pressures to act and sound like a medical expert. These forces are not equally distributed across medicine, however. While physicians seem to share certain social constraints, such as the tendency towards weak MAE forms discussed above, they also develop more specific sub-group constraints related to their experiences in practice. This is illustrated for MAE in comparing Pediatricians with the entire outpatient medicine sample. YEARS IN

PRACTICE influences Pediatrician MAE use as well as that of physicians more generally, while Pediatricians seem to be uniquely affected by GENDER. Similarly, within the medical condition-based samples, each disease state had its own marker for the effect of physicians' professional vision (Goodwin 1994) on MAE use (i.e., disease SEVERITY, HBA1C, and patient ETHNICITY), where physicians' biomedical perspective on their patients' presentations impacted their variation in related yet distinct ways. One might classify medical specialties or condition-based interaction types as CoPs within a larger CoP, whereby they share constraints characteristic of the larger group in addition to their own in-group constraints. This nesting of one community within another is analogous to regional variants of a greater dialect. While Pediatricians produce MAE in accordance with constraints on physician speech, they do so in a specialty driven way. Pushing the analogy a bit further, diabetes specialists may speak ENDOCRINOLOGIST as a sub-dialect of PHYSICIAN, but they do so with a DIABETIC SPECIALIST accent.

Though physicians share in-group, characteristic social constraints on their MAE use, both as a whole and within meaningful sub-groupings, that is not to say that they do not adhere to greater community trends. In terms of consistency with other populations, physicians produced the expected association between MAE COMPLEMENT and VERB TYPE predicted by Van linden's (& Davidse 2009) historical data (i.e., pairing infinitival complements with mental verbs). Additional work is needed on different populations and social situations in order to fully appreciate the extent to which physicians do or do not conform with more general patterns in MAE use. Though the current study offers substantial evidence that some of physicians' social constraints are community internal, the question of how physicians compare to other professionals or non-professional users of MAE should be a priority for future research.

6.4 MAE as evidence for professional socialization processes

One other important way in which physicians are differentiated with respect to MAE use within the larger physician CoP is their relative professional maturity. In contrast with the specialty CoP subgroups, however, the nesting of more experienced versus less experienced physicians within the larger physician community is continuous rather than discrete. YEARS IN PRACTICE, a continuous measure of physician experience, was the only significant social factor predicting MAE production for the medical sample at large, both in terms of structural features and rising intonation. It indicates that the social influences on physician speech may change over time in practice. Despite an overall preference for mitigated forms, as shown by the use of relatively weak MAE feature variants, physicians seem to use more forceful, authoritative-sounding MAE features as they mature professionally. This finding emphasizes the fact that socialization processes are not necessarily linear progressions toward a community norm. CoPs have structure: both within and with respect to one another. Even within a sub-grouping (e.g., Pediatrics), members may continue to develop new sociolinguistic pressures as their role within the community evolves. This concept is analogous to age-grading (e.g., Wagner & Sankoff 2011; Wagner 2012; Sankoff 2013), but with respect to one's professional lifespan, irrespective of chronological age. I have proposed that 'experience-grading' might be more fitting term for this process. As physicians gain experience, they may be socialized into the use of strong forms based on such forms' relative effectiveness in conveying obligatory force. They may also be adjusting their strong form frequency to match professional mentors (Eckert & Wenger 1994) or to reinforce their expert identities. As these pressures outweigh or replace drives to perform negative politeness, mark uncertainty, etc. physicians may shift their overall preferences towards stronger forms.

Crucially, however, my qualitative analysis of rising intonation on MAE forms hints at a change in variant function as well as form distribution over physicians' professional lifespan. Physicians are not only using stronger, authoritative feature variants as they mature, but

they are also using them in more expert-like ways. For example, with respect to MAE-final rises, more experienced physicians seem to be using rises to hold the conversational floor or support complex, multi-utterance recommendation processes (i.e., recommendation + rationale, or recommendation + qualification), processes that display and interactionally construct expertise. By contrast, comparatively inexperienced physicians are not performing these expert functions. Instead, they use rises to weaken the authoritative connotations of recommending, deconstructing their interactional expertise. Thus it seems as if physicians are socialized into the various layers and nuances of MAE production as a means of indexing and affirming their professional expertise.

6.5   Context, limitations, and future work

This dissertation used MAE, a single semi-modal construction, as an entrée into the study of recommendations and their contribution to interactional style. Obviously MAE-style recommendations are only a small part of a larger system of deontic, illocutionary acts used for advice-giving. The intent of the current work is to provide a means of rigorously approaching recommendations from the variationist perspective. I leave the task of comparing and contrasting the sociolinguistic behavior of different recommendation forms to future research.

Even within the scope of MAE studies though, there are several topics that deserve additional attention. In particular, this dissertation has not addressed the effects of discourse context on MAE perception or production. For instance, embedding under a mental verb (e.g., *I think it's important for you to...*) would intuitively impact an MAE token's obligatory force perceptions. Similarly, MAEs produced along with supportive rationale (e.g., *It's important that you take your pills so that your cholesterol stays down.*) may have a different social meaning from those produced in isolation. These and other related MAE-external features may also impact production patterns, contributing to physicians' overall construction of an advice-giving exchange. Such factors were not considered here simply due to the lack of prior research on MAE's internal variation. Subsequent work can and should expand

beyond clause-level processes to characterize MAE's role in the larger treatment discussion.

Studies outside of the highly specific context of physician-patient interaction are also needed to understand the greater sociolinguistic significance of MAE and other recommendation forms. Without a substantive body of community studies on MAE and related forms, it was difficult to disentangle the effects of this study's medical frame from more general patterns of MAE use. It is hypothetically possible, for example, that the experience grading effects observed for physicians are actually indicative of a more general process. Other professionals or individuals who routinely make recommendations (e.g., parents) may also increase the strength of their MAE-style recommendations over time. If this were the case, then experience-grading would be more akin to an acquisition process than a socialization process. It would be less about community norms and more about communicative effectiveness. That being said, a small-scale study of MAE*imp* in academic discourse did not find an effect of speaker role (student v. faculty), despite demonstrating evidence of co-variation within strong and weak feature variants (Hesson 2013). This limited evidence suggests that professional socialization within medicine may, in fact, be a primary driver of experience grading within MAE forms. Nonetheless, as noted above, additional studies of MAE are called for, both within professional communities and in non-transactional discourse.

6.5.1 Medical applications

Though the primary implications of this dissertation are theoretical, the results as well as the methods exemplified here have indirect applications for medical practice. They highlight medically relevant correlations for further exploration. For example, the finding that stronger MAE forms are associated with certain patient ethnicities may point to differential communication patterns with the potential to impact care. Additional research should attempt to explain these descriptive findings and ascertain their clinical significance. Furthermore, as suggested in Chapter 1, the methods used in this work represent a first step towards describing a linguistic basis for physicians' interactional styles. More specifically,

concepts such as 'patient centeredness' that have been defined on an abstract or behavioral level might benefit from studies of this kind, as sociolinguistic patterns are likely to form the mechanistic basis for the effectiveness of such interactional techniques.

The next logical step for developing the clinical applications of this research involves translating this and similar studies into an experimental paradigm where the effects of sociolinguistic variation on health outcomes, patient satisfaction, etc. can be tested directly. In the case of MAE in particular, behavioral experiments assessing the impact of MAE strength on patients' intent to adhere to MAE-style recommendations should be conducted. If physicians' use of particular MAE forms is found to influence patients' attitudes towards treatment or perceived self-efficacy to adhere, the current work could be used to design physician training interventions based on the interactional value of different MAE-style recommendation forms.

6.6 Conclusion

MAE is composed of numerous within-variable features that seem to form a pragmatic and stylistic construction (Eckert 2013). Other semi-independent variable processes can overlap with this structural unit to create a pragmatic/ stylistic bricolage (à la Hebdige 1979), a layering of similarly valued features whose superimposition produces a magnified, holistic effect. Specifically, strong features (i.e., finite complements, intensifiers, action verbs, and personal intended modal agents) appear to co-vary in terms of their evaluation and production, contributing to the projection of an authoritative style. Furthermore, physicians' use of these features appear to vary over the course of their time in practice and with respect to medically meaningful social categories (e.g., medical specialty, disease severity, etc.), pointing to a continuous re-valuation of MAE's forms and their collective interactional implications through professional socialization processes.

Physicians may benefit from increased awareness of the implications of their MAE variation, as it represents a potential tool for reinforcing clinical recommendations. To the

extent that strong MAE features may be used in the construction of a confident-sounding, authoritative style, physicians may wish to consciously employ them in clinically challenging situations. Conversely, weak forms (i.e., forms with infinitival complements, mental verbs, and inexplicit or impersonal modal agents) may serve as useful mitigators in scenarios where a more indirect approach is warranted. Moreover, the uncovering of quantitative production patterns such as those demonstrated here may provide a basis for opening a cross-disciplinary dialogue between variationists and medical practitioners. Associations between patient characteristics and the use of certain recommendation forms might be explored as indicators of physicians' incipient attitudes and ideologies. They might also inform the experimental research on the effects of sociolinguistic variation on patient satisfaction and medical outcomes. Such work is needed in order to integrate medical communication research into the evidence-based domain of clinical practice.

APPENDICES

Appendix A

Demographic questions

(52) Please indicate your gender.
  a. Male
  b. Female
  c. Other

(53) In what year were you born?

  (list of years)

(54) Are you a native speaker of English?
  a. Yes
  b. No

(55) Please rate your overall health.
  a. Poor
  b. Fair
  c. Good
  d. Very good
  e. Excellent

(56) Have you ever been diagnosed with a chronic illness?
  a. Yes
  b. No
  c. Not sure

(57) How many times per year do you visit a doctor?
  a. 0-2
  b. 3-5
  c. 6-8
  d. 9-11
  e. 12+

(58) How do you prefer to make decisions about medical treatments?
  a. I prefer to make the final selection about which treatment I will receive
  b. I prefer to make the final selection of my treatment after seriously considering my doctor's opinion

c. I prefer that my doctor and I share responsibility for deciding which treatment is best for me

d. I prefer that my doctor make the final decision about which treatment will be used but seriously consider my opinion

e. I prefer to leave all decisions regarding my treatment to my doctor

Scenario-based questions

In the following scenarios (59-66), imagine that you are a medical doctor. Your responsibility is to encourage patients to act in ways that are beneficial to their health. For each situation, provide your patient with appropriate instructions by selecting one statement from the options provided.

(59) Mary has a severe infection in her foot. You've prescribed antibiotics that will cure her infection. If Mary does not take the antibiotic pills and her infection spreads, she will need to have her foot amputated (removed). What are you going to tell Mary?

a. It's necessary to take your antibiotic pills

b. It's necessary to take the antibiotic pills

c. It's necessary that you take the antibiotic pills

d. It's necessary for you to take the antibiotic pills

(60) Fred has very high blood pressure. Fred's high blood pressure puts him at risk for a heart attack. Avoiding salty foods will lower Fred's blood pressure. What are you going to tell Fred?

a. It's good to consider avoiding salty foods

b. It's important to consider avoiding salty foods

c. It's good to avoid salty foods

d. It's important to avoid salty foods

(61) You're concerned about Jan's lack of activity. She tells you that she "lays around on the couch all day". This isn't good for her, but the last time you suggested that she get some exercise, she looked offended. What are you going to tell Jan?

a. It's crucial to get some exercise

b. It's desirable to get some exercise

c. It's vital that you get some exercise

d. It's important that you get some exercise

(62) Jim has diabetes. Sometimes Jim's blood sugar gets dangerously high. If Jim's blood sugar becomes too high, he could die. Regular blood sugar checks prevent Jim's blood sugar from becoming too high. What are you going to tell Jim?

a. It is important for you to check your blood sugar

b. It is important to check your blood sugar

c. It is important that you check your blood sugar

(63) Sue is pregnant. She has had trouble with drinking in the past, drinking seven or eight glasses of wine each day. If Sue continues to drink heavily, her baby will have health problems. What are you going to tell Sue?

   a. It is critical to stop drinking during pregnancy

   b. It is necessary to stop drinking during pregnancy

   c. It is crucial to stop drinking during pregnancy

   d. It is good to stop drinking during pregnancy

(64) Sue (the same pregnant woman from E) got annoyed when you told her not to drink during her pregnancy. She asked, "Don't you have any manners?" and frowned at you. Unfortunately, Sue also smokes two packs of cigarettes per day. This too could cause problems for her baby. What are you going to tell Sue this time?

   a. It's essential that women stop smoking during pregnancy

   b. It's essential that you stop smoking during pregnancy

   c. It's essential that we stop smoking during pregnancy

(65) Robert has a bone disease that affects his joints. If he doesn't take vitamins every day, his condition will get worse. Eventually, he will be unable to walk without pain. What are you going to tell Robert?

   a. It's very important to take your vitamins

   b. It's extremely important to take your vitamins

   c. It's important to take your vitamins

(66) Lisa is overweight. Her mother died from a stroke at fifty years old. You're afraid that if Lisa doesn't lose weight, she will be at risk for a stroke as well. Last time you brought up her weight, it didn't go very well. Lisa called you "rude" and looked very upset. What are you going to tell Lisa?

   a. It is vital for you to lose weight

   b. It is vital to lose weight

   c. It is vital that you lose weight

In the next scenario, pretend you are a patient. You're visiting your doctor for the first time after having a heart attack. Your doctor is concerned that you may be at risk for another heart attack in the future. He prescribes several medications for you to take. You can only afford one medication from each category (67-72). Choose one pill to buy from each category.

(67) Your doctor says:
"It's important to take the purple pills... It's important that you take the gray pills."

   a. Buy the gray pills

   b. Buy the purple pills

(68) Your doctor says:
"It's very necessary to take the maroon pills... It's necessary to take the yellow pills."

a. Buy the yellow pills

b. Buy the maroon pills

(69) Your doctor says:

"It's crucial to take the red pills... It's crucial that we take the black pills."

a. Buy the red pills

b. Buy the black pills

(70) Your doctor says:

"It's essential for you to take the orange pills... It's essential that you take the white pills."

a. Buy the white pills

b. Buy the orange pills

(71) Your doctor says:

"It's important that you consider taking the pink pills... It's important that you take the silver pills."

a. Buy the silver pills

b. Buy the pink pills

(72) Your doctor says:

"It's vital that you take the brown pills... It's vital to take the magenta pills."

a. Buy the brown pills

b. Buy the magenta pills

Character assessments

Please listen to the audio clip of a doctor making a recommendation to her patient and answer the questions that follow with respect to this recommendation.

Set of recommendations (to be presented in random order)

It's important to exercise

It's important that you exercise

It's extremely important that you exercise

It's important for you to exercise

It's important for you to consider exercising

It's important to exercise [with HRT]

It's important to exercise [with creak]

It's important that you exercise [level]

(73) Rate the strength of this recommendation on a scale from 1-10. "Strong" (10) means that the patient is required to follow the recommendation. "Weak" (1) means that the patient is NOT required to follow the recommended action (i.e., it is optional).

(1 (Weak), 2, 3, 4, 5, 6, 7, 8, 9, 10 (Strong))

(74) Rate this doctor's beside manner on a scale from 1-10. "Excellent" (10) means that this doctor exceeds your expectations for bedside manner and that you would refer a friend or family member to her. "Poor" (1) means that this doctor does not meet your expectations for bedside manner.

(1 (Poor), 2, 3, 4, 5, 6, 7, 8, 9, 10 (Excellent))

For the following questions, imagine that you are a patient of the doctor giving the recommendation you just heard. Indicate the extent to which you agree or disagree with each statement.

(75) I would say everything to this doctor that was on my mind.

(Strongly disagree, Disagree, Agree, Strongly agree)

(76) I wouldn't get to ask this doctor the questions I wanted to ask.

(Strongly disagree, Disagree, Agree, Strongly agree)

(77) This doctor would be kind and considerate of my feelings.

(Strongly disagree, Disagree, Agree, Strongly agree)

(78) This doctor would "talk down" to me.

(Strongly disagree, Disagree, Agree, Strongly agree)

(79) I would feel understood by this doctor.

(Strongly disagree, Disagree, Agree, Strongly agree)

(80) I would feel like I could trust this doctor.

(Strongly disagree, Disagree, Agree, Strongly agree)

(81) I would have confidence in this doctor's abilities.

(Strongly disagree, Disagree, Agree, Strongly agree)

Post-task survey

(82) How did you decide what to tell each patient while pretending to be a doctor?

(83) How did you select which pill to take when answering questions from a patient's perspective?

(84) Were there any particular strategies you used in judging how strong or weak a recommendation was?

(85) Were there any particular strategies you used in judging the doctor's bedside manner?

(86) In general, what contributed most to your impression of the doctor's overall character?

(87) If you have any additional comments on this survey, please write them here.

Appendix B

```
# Praat script for a Sound and TextGrid sample with
# two tiers and labelled intervals.
# Outputs the  pitch by 10 millisecond increments within
# each interval according to Speaker,
# Token number, Token (word), Pitch, and Time.
# author Joy Zhong
# edited by Ashley Hesson (March 2014)

# Tier1 is the phonemic transcription and
# tier2 is the orthographic transcription.
#The orthographic transcription is the Token as written.
tier1= 2

# Pitch constants.
minf0 = 75
maxf0 = 600
silence_threshold = 0.03
voicing_threshold = 0.25

# Measure pitch every 10 milliseconds.
timestep = 1/100

# Clear to begin.
clearinfo

# Select the Sound and TextGrid sample.
sound = selected("Sound")
label2$ = selected$("Sound")
textGrid = selected("TextGrid")
select textGrid
nIntervals1 = Get number of intervals... tier1

select sound

# Write to a new file.
deleteFile ("Praat_output.txt")
fileappend Praat_output.txt Token_Number 'tab$' Speaker 'tab$'
...Token 'tab$' Pitch 'tab$' Time 'newline$'
select sound

# Select the pitch.
To Pitch (ac)... 0.0 minf0
...15 no silence_threshold voicing_threshold 0.01 0.35 0.14 maxf0
pitch = selected("Pitch")
```

```
token = 0

# Loop through each interval. If that interval has a label,
# get the tier 1 and tier 2 labels,
# token number, pitch for every 10 ms within that interval,
# and the corresponding time.
for i to nIntervals1

select textGrid
label1$ = Get label of interval... tier1 i

# Check if interval label is not empty.
if label1$ != ""
token += 1

startTime = Get starting point... tier1 i
endTime = Get end point... tier1 i
select pitch

duration = endTime - startTime
intervalNumber = duration / timestep

for t from 0 to intervalNumber

# Increment the time by the timestep.
time = startTime + t * timestep

# Get pitch for that time.
f0 = Get value at time... 'time' Hertz Linear

# If no pitch is listed for that time, set the pitch to 0.
if f0 = undefined
undefined$ = "undefined"
fileappend Praat_output.txt 'token' 'tab$' 'label2$'
...'tab$' 'label1$' 'tab$' 'undefined$' 'tab$' 'time:2''newline$'

#If we want to use 0's instead of "undefined"
# in the case that the pitch isn't listed:
#if f0 = undefined
#    f0 = 0

# Append results to the file previously created.
else
fileappend Praat_output.txt 'token' 'tab$' 'label2$'
...'tab$' 'label1$' 'tab$' 'f0:2' 'tab$' 'time:2' 'newline$'
```

```
    endif

    endfor

    endif

endfor

select pitch
Remove

writeInfoLine( "done " + label2$)
```

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