Can prosodic cues accurately identify constituent boundaries with cross-dialectal homophones? *With* as a particle in the Minnesota English Dialect

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1. Statement of problem and research questions

In the Minnesota or Upper Midwest (Allen, 1973-76) dialect of Standard American English, utterances such as *Do you want to come with?* or *I'm not going to be able to go with* are all grammatical. In fact, they are commonly heard and used. For one reason or another, though, for a vast majority of English speakers, constructions ending in *with* similar to the aforementioned are clearly marked and/or ungrammatical forms, but—I would contend—not simply because they break the prescriptive grammar rule: "Don't end a sentence in a preposition." Moreover, for speakers outside of this dialect area, such constructions typically beg the question, "with whom," illustrating that, intuitively, there must be some sort of object (e.g, pronoun) following the apparent preposition *with*, as discussed by Dennis Preston (1993) in *"Heartland" English: Variation and Transition in the American Midwest*, who notes that "*would you like to come with* is opposed to the rest of the country's need for a pronoun in such constructions—*with me* (or *us,* etc.)" (23).

Preston's intuition is supported by a variety of scholars of American English and dialectology discussing this construction. Michael D. Linn (1988), a past president of the American Dialect Society and renowned researcher of the Iron Range dialect in Northern Minnesota, notes that "one common pattern on the Range . . . as in the rest of Minnesota, is the ending of a sentence with a *with* that does not have a surface structure object" (83). Here, Linn illustrates the typical response to the *come with* construction: It is a "standard" preposition, missing its surface object (most likely a pronoun and/or the speaker of the utterance). In fact, in a response article in *American Speech*, Charles Doyle (1997) of the University of Georgia remarks that this [*come with*] use is "elliptical" and "perhaps not dissimilar to idiomatic expressions . . . in which the object . . . remains unexpressed" (224), again resolutely analyzing this *with* as a preposition—albeit one that "acts" in a sub-standard manner.

Further, on some of the most highly-regarded listservs addressing language questions, other linguists have weighed in on the issue. For example, in a posting on the American Dialect Society list by Beverly Flanigan (2004) of The Ohio State University, the discussion reads: "Can I come with? [when it's clear that the addressee is the missing object] . . . that is the object of the preposition, not of the verb." Here, the author of the comment is clearly stating that *with* must be followed by an object noun phrase (NP), which functions as the object of the apparent preposition *with,* as opposed to *with* being a particle (as part of a phrasal verb), and the object NP being the object of the verb.

This established incongruity of grammaticality among speakers of American English invites an analysis of these *with* constructions in the Minnesota/Upper Midwest dialect. Is it a preposition with a null or elided object (no surface realization), or is it a particle that is part of the phrasal verb, *come, go,* or *ride with*? The current literature that addresses the categorization of *with* typically considers it a preposition; there is very little reference, if any, to *with* being

analyzed as a particle, and very few listed verbs that select *with* as a particle. So the question remains: In the sentence, "*Do you want to come with?*" what exactly is the word *with*?

This paper will work from the hypothesis that the homophonous *with* (the preposition *with* also exists) in the Minnesota/Upper Midwest dialect is, in fact, a particle, specifically when used in coordination with these verbs of movement. No pretense is made that all verbs, or even all verbs of movement take *with* as a particle, but rather that the Minnesota or Upper Midwest English dialect does display the use of *with* as a particle, whereas in other American English dialects, it typically functions as a preposition in the same constructions. The main focus will be on three verbs, *come, go,* and *ride,* to illustrate this syntactic phenomenon. Although, for many Minnesota/Upper Midwest speakers, the proposed analysis of *with* extends to the larger class of verbs and includes at least six verbs which do, admittedly, exhibit scalar grammaticality judgments, dependent on object placement (although, all are grammatical) and include intransitives *come, go,* and *ride,* and transitives *take, bring,* and *carry.* But, for the sake of simplicity and clarity of the scope of this particular endeavor, I will focus only on the two most-often discussed and used verbs, *come* and *go*, as well as *ride*. Each of these lexical verbs will be used as part of a phrasal verb, adjoined to the particle *with,* to elucidate its classification and grammatical category in this dialect. Further, it will be directly compared to its prepositional homophone and counterpart, *with*. Finally, due to its objectives and space limitations, this study will only report on data collected from Minnesotans and is not representative of the Upper Midwest Dialect as a whole. Other regions and states will be included in subsequent studies.

In separate, previous, and related endeavors, this construction has been hypothesized and potentially "clearly" demarcated as a particle through both a syntactic analysis—one that employed a variety of syntactic constituency tests, along with an LFG-style analysis to illustrate that the particle characteristics it exhibits are lexically driven—and an historical discussion of the language contact situation that precipitated this construction's use and retention in this specific dialect. Literature on constituency tests is unswerving in the ability of these tests to clearly demarcate prepositions from particles. Said analysis followed in that tradition, applying the tests and illustrating corresponding grammaticality judgments for sentences containing a *P* (either preposition or particle) element, which was ultimately successfully analyzed as a particle. Ultimately, the Minnesota Dialect's *come with* (e.g, *Do you want to come with?*) is hypothesized (by the author of this paper) as comprising a constituent, a *verb + particle*, phrasal verb construction.

Since *with* in this context (as part of a limited set of phrasal verbs of movement) has preliminarily been established as a particle, the crux of this discussion will be to employ an acoustic analysis (using the current version of Praat) in an attempt to further evidence the hypothesized categorization of this *with* as a particle in the Minnesota Dialect of American English. This study builds on contemporary prosody research that addresses the role of duration, pitch, and amplitude in determining constituent boundaries. In all, I hypothesize the following syntactic structures found in Figures (1), examples 1-4, below—structures in Minnesota vs. Other, non-Minnesota dialects.

Ultimately, examples 1-4 endeavor to clarify my hypothesis: Minnesota has a verb + particle construction (when there is no "object" realized); speakers of other dialects do not, but rather process the P-element as a preposition in both situations—with or without a surface object. More specifically, this analysis is concerned with several questions: Is *with* in the Minnesota dialect a particle, as attached to a phrasal verb of movement, *come*, *go,* or *ride*? Do American English speakers from different dialect areas produce significantly contrasting prosodic cues to

demarcate *with* as a particle from *with* as a preposition? Is it the case that prosody can cross-dialectally disambiguate the *with* homophones to illustrate the particle existence in Minnesota and lack thereof in other areas? Can a prosodic analysis help prove the hypothesis that *with* in Minnesota is a particle?

Minnesota P-Structures:	***Other Dialect P-Structures:***
(1) **VP** **V + P (Part) = [verb + *with*]**	(3) **VP** **V + PP (P + ___) = [verb [with + null object]]**
(e.g, *come with*; with is a particle)	(e.g, *come with* (me); the object is the speaker)
(2) **VP** **V + PP (P + NP) = [verb [*with* + NP object]]**	(4) **VP** **V + PP (P + NP) = [verb [*with* + NP object]]**
(e.g, *come with X*; *with* is a preposition + NP)	(e.g, *come with me*; the object (me) is realized)

Figure 1: Proposed Syntactic Structures of Minnesota vs. Other Dialects

2. Review of relevant prosody studies

In general, there are four major areas of prosody literature that need addressing in order to contextualize the current investigation: 1) the relationship between prosody and syntax (constituency demarcation), 2) stress patterns of particles and prepositions, 3) the ability of prosody to disambiguate syntactic structures that include homophones, and 4) the prosodic characteristics relevant to an analysis for said disambiguation/demarcation.

2.1. Relationship between syntax and prosody

The close relationship between syntax and prosody is well-documented in the prosodic literature; a number of studies suggest a supporting, if not an essential role of prosody in determining the constituent structure—of grouping words into constituents—of sentences (Bever, Lackner and Kirk, 1969; Geers, 1978; Wingfield, 1975; Wingfield, Buttet and Sandoval, 1979). Accordingly, some syntactic information can be extracted from prosodic cues, in particular, information about the location of syntactic constituent boundaries. Previous research has shown that prosodic cues can be useful for on-line adult syntactic processing (e.g, Milotte, 2005; Milotte and Christophe, 2003). In fact, according to Lehiste (1973), it is very often the case that different syntactic structures are produced with different prosodic structures. In many cases, prosodic constituent boundaries are aligned with either the left or right edge of particular types (e.g, preposition vs. particle) of syntactic constituents (Selkirk, 1986; Truckenbrodt, 1999). The distribution of phonological boundaries and their relation to the syntax has been formulated and illustrated by Truckenbrodt (1995: 13), as in (5), below (from Dehé, 2002: p. 135):

(5) Insert a $-boundary in the phonological representation to the right of each XP [where $ is an arbitrary boundary symbol].

Essentially, what the rule in (5) suggests is that, in English, speakers employ prosodic cues to demarcate the right edge of phrases (XP) by verbally emphasizing said boundary. It is this fact that helps pave the way for the analysis of *with* in the Minnesota Dialect, as will be born out in subsequent sections.

It has further been noted that listeners (and, consequently, speakers) are able to make use of the syntax-prosody relationship to accurately locate syntactic boundaries from prosodic information alone, regardless of lexical information provided (e.g, Collier and Hart, 1975; Collier, de Pijper and Sanderman, 1993; Sanderman, 1996). These studies successfully made use of prosody with no substantial lexical content included in the utterances (i.e, nonsense words). Also, according to David Crystal (1969), grammatical considerations are relevant to the study of intonation insofar as it can be shown that a given grammatical structure has a regular correlation with a given intonation pattern, and that a change in intonation (prosody) causes one to re-label (or re-interpret) the syntactic structure of an utterance, no other morphological change being necessary (255). It is this fact, that prosody can and does change the analysis of the syntactic structure, that allows for the use of these cues to help us understand what *with* actually is in the Minnesota Dialect—a particle or preposition.

2.2. Relative stress of particles and prepositions

In order to determine how and what prosodic information is necessary to identify *with*'s category, some standard information about the prosody of particles and prepositions is necessary. It is well-documented that the major prosodic distinction between particles and prepositions is that particles "carry stress accent, which is characteristic of particles, but not of prepositions" (Diessel and Tomasello, 2005: 109). Further, Svenious (2003) notes that the most reliable distinction between prepositions and particles (when some syntactic ambiguity or lack of clarity exists) is taken to be stress placement. The P element (particle or preposition) that is ultimately a preposition is unstressed, whereas the particle P is stressed. This is systematic, according to Svenious, for particles, where they consistently bear a phrasal stress (345).

This prosodic or stress distinction has been discussed by a variety of scholars. Kingdon (1958) categorizes what he terms "stressable" and "non-stressable" word classes; particles are demarcated as stressable and prepositions as non-stressable linguistic elements. This idea is reiterated, albeit with different terminology, by Bengt Altenberg (1987), who discusses the "prosodic potential" of words and word categories, and establishes rankings for both prepositions and particles (among all other word classes). According to Altenberg, particles have substantially more prosodic or stress potential than prepositions, which is—to some extent—based on their relative position to a constituent boundary. In fact, Nicole Dehé, who does extensive work on particles, posits that, "One could argue that the particle has its own semantic content and can therefore be stressed, especially in compositional (V+P) particle verbs" (Dehé, 2002: 166), further illustrating that particles do take stress. In the end, it is this classification of the prosodic potential of these two syntactic categories—particles and prepositions—that allows for an acoustic analysis to determine the category into which *with* in Minnesota belongs.

2.3. Prosody and syntactic disambiguation

Yet another major contribution from the prosodic literature, a contribution relevant to the current endeavor, is related to the ability of prosody to help disambiguate syntactic structure. Several

sentence comprehension studies have established that phrasal prosody can disambiguate syntactic structure (Beach, 1991; Speer, Kjelgaard and Dobroth, 1996; Marslen-Wilson, Tyler, Warren, Grenier and Lee, 1992; Nagel, Shapiro and Nawy, 1994; Stirling and Wales, 1996). Thus, listeners (and speakers) are able to exploit major phonological phrase boundaries to parse and resolve syntactically ambiguous sentences (Millotte, Wales and Christophe, 2007: 899). Basic research into the relationship between intonation and speaker's intentions about syntax and information structure addresses whether, when, and how speakers use prosodic information to signal linguistic and paralinguistic meaning. Speakers tend to use prosody for a range of functions in communication, one of which is to indicate the intended syntax of ambiguous (or potentially ambiguous) utterances (Ito and Speer, 2006: 230).

In a recent study, Millotte, Wales, Dupoux and Christophe (2006) used temporarily ambiguous sentences, exploiting the fact that two homophones can belong to different syntactic categories (e.g, particle and preposition; verb and adjective for Millotte), concluding that "phonological phrase boundaries can thus guide the syntactic analysis of spoken sentences" (1). Accordingly, prosodic information functions to assist in building a skeleton of the syntactic structure of the sentences in English, due to the fact that the syntactic boundaries are given by prosody (since phonological phrase boundaries correspond with syntactic constituency boundaries) (Millotte et al, 2006: 2). Although the current investigation is not concerned with the actual perception or parsing of these constructions (in terms of disambiguating), the ability for prosodic cues to assist in such an endeavor plays a large role in the set-up and analysis of the results.

In terms of interpreting syntactic structures with the assistance of prosodic cues, Nespor and Vogel (198) propose that two interpretations of the same syntactic structure can be distinguished only if their prosodic constituent structure differs. Prosody marks boundaries and delimits constituents which do not always correspond to syntactic units. If the two interpretations of an utterance have the same syntactic constituency, the prosodic structure must also be identical, since the first determines the second. But in all other cases (i.e, when the constituent boundaries are differently located, irrespective of the labels of the constituents), the prosodic phrasing can vary in accord with the syntactic constituency and labeling, and the two interpretations may be prosodically distinguished (as cited in Cutler et al., 1997: 163). What this suggests is that syntactic information can be extracted from prosodic cues, in particular, information about the location of syntactic-constituent boundaries.

In order to extract this information, as well as to produce syntactic constructions that use prosodic cues to illustrate syntactic constituency, some understanding of the options and relevant syntactic structure is necessary for both listeners and speakers. Kraljic and Brennan (2005) conclude that prosodic cues are a by-product of planning and articulating utterances. Thus, in terms of this study, speakers must either possess "knowledge" (they have the structure in their particular grammars), or they don't. This, then, predicts that those from Minnesota that have *come with* as a verb + particle will clearly demarcate it from a verb + preposition construction with prosodic cues.

2.4. Prosodic features relevant to homophonic disambiguation

The specific prosodic cues that I will be analyzing have to do with several suprasegmental aspects. These characteristics of words may, for instance, be influenced by position in syntactic structure: Greater F0 movements and longer segmental durations are observed before major

syntactic boundaries (Vaissière, 1975; O' Shaughnessy, 1979; Cooper, 1976; Bouwhuis and de Rooij, 1977; Cooper and Paccia-Cooper, 1980; Garro and Parker, 1982). Further, there is similarity across languages in the prosodic correlates of utterance position (as cited in Cutler et al, 1997: 159). Accordingly, one of the first characteristics that I will be addressing, using the most recent version of Praat, is that of tone-unit length or duration. Crystal (1969) posits that there is a correlation between the average length of tone-unit and certain categories of language variety, and a less marked correlation with the idiosyncrasies of different speakers (256). Here, Crystal illustrates the apparent ability of measuring tone-unit length to demarcate cross-dialectal difference, regardless of individual speaker differences (of the same variety). Bolinger (1958), among others, observes that accented or stressed syllables are normally longer than unaccented ones in comparable positions within the utterance (138). As noted in Dehé (2002), "The most clear function for final syllable lengthening is undoubtedly as a boundary marker" (166), which is why I have focused my data on locating the *with* element at the end of phrases (phrasal verbs), as will be seen in subsequent sections. Thus, when stressed, P elements should have a greater tone-unit length/duration if they fall into the particle category than when they are prepositions.

In addition to analyzing the tone-unit duration, I will address pitch (average frequency), and the F0 of *with* in both the Minnesota and non-Minnesotan (Other) speakers, comparing particles and prepositions. According to Dehé (2002), in English, F0 (fundamental frequency) is the strongest correlate of how the listener perceives the speaker's intonation (i.e, of accent placement and phrasing) (134). Thus, in order to illustrate a prosodic demarcation of preposition *with* and particle *with*, I will look for trends in F0 (and average pitch frequency), focusing on the relative difference between Minnesota and Other speakers, as well as the difference in pitch between particles and preposition. Because *with* as a particle falls at the right edge of a syntactic boundary, and the right edge of a syntactic XP will coincide with a phonological phrase boundary (Dehé, 2002: 145)—the entity of the prosodic representation that is derived in a systematic way from syntactic phrases—I expect both a greater F0 and overall pitch frequency on particle *with* than on preposition *with*.

The final prosodic characteristic addressed is loudness, amplitude, or intensity of the relevant speech output. Generally, stressed syllables or phrasal boundaries have greater intensity or acoustic energy than unstressed syllables. The loudness or relative loudness of a number of successive units (i.e, syllables or changes of loudness within one element) can be measured to determine stress (Dehé, 2002: 134). However, loudness is the least important and least consistent parameter for signaling stress compared to duration and pitch, as discussed above. Nonetheless, it will function as a fourth factor in demarcating *with* as a particle in the Minnesota Dialect of English. The one significant issue in measuring the length of the *with* in the test sentences is related to the fact that, when *with* is a preposition, it is immediately followed by an object. Thus, when occurring as a particle in sentence-final position, we would already expect a lengthened *with* (for the particles). Thus, when analyzing the results of the data, I will focus on the relative difference of length between the particle and the preposition for each speaker, and compare the averages of the Minnesota and Other participants.

3. Methodology: participants, materials, procedure

The current investigation is a pilot study (only addressing Minnesota speakers) that, at its heart, aims to determine the difference in prosodic stress assigned to *with* by speakers of American English in an effort to help prove the hypothesis that *with* in Minnesota is a particle and not a

preposition in this limited context. In order to do so, data was collected from both native Minnesota speakers and those from dialect regions outside of the Minnesota Dialect. Ultimately, the methodology of this study is fairly straightforward and empirical in nature—asking participants to read twelve English sentences aloud, while being recorded.

3.1. Participants

In all, I was able to gather data from a total of twelve (n = 12) research participants; six native speakers (life-long residents) of Minnesota and six non-native speakers (those from regions outside of Minnesota) took part in this experiment. Of the six Minnesota speakers, the ages of participants covered the age ranges from 15-24 to 65-74, with no participants falling in the 55-64 year range. This was a conscious attempt to illustrate that the *X with* construction is one that has not only existed historically (hence the upper age range), but also that it still exists in the speech of current, younger citizens. The age range of Other speakers/residents ranged from the 15-24 to 35-54 age ranges. Further, although the participant range (for both groups) included 15-24, the youngest participant in the study was 24. Although participant ages were recorded, they were not (systematically) factored into the results of the study; I did not quantify and compare responses by age.

Further, all twelve study participants maintained that they had, at least, "some college education" (3), while the vast majority had "a bachelor's degree" or higher (9). This information was recorded simply to ensure that participants were able to read (with no discernable difficulty) the sentences presented to them.

In a brief informational survey, participants were asked 1) where they are from and how long they lived there, 2) where they spent their formative years, 3) if they ever lived in Minnesota or any other Upper Midwest states and for how long, and 4) where they currently reside and for how long they have lived there. Of the six Minnesota speakers, all six (6) recorded that they had lived in Minnesota "all of their lives," both growing up there and continuing to live there. None (0) of the Others had ever lived in either Minnesota or any other Upper Midwest state, and maintained that they "grew up" in the states that they recorded on their survey (although they all currently reside in West Lafayette, Indiana). Of the Others (non-Minnesotans), a variety of states and linguistic regions were represented: Indiana (1 Central; 1 South on the Kentucky border), Texas (1), New York (1), Massachusetts (1), and California (1). Finally, none of the twelve participants had any formal linguistic training or knowledge, other than the "grammar" they learned in school, nor had they done any significant reading regarding linguistics. All twelve were native speakers of English, speaking it their entire lives.

3.2. Materials

Typically, research on the production of prosody has relied on the comparison of carefully selected utterances (sentences) that involve some intonational feature, contrasting minimally in different conditions. Participants/speakers are required to pronounce or read a sentence in some manner that will reveal their use of the relevant prosodic information to indicate the intended interpretation. The results of those studies reveal that speakers do use available prosodic contrasts in their production (Ito and Speer, 2006: 230). Thus, the utterances for this study were crafted in a similar fashion. The materials of this study consisted of twelve sentences, all containing either *come with*, *go with,* or *ride with*, where the *with* is either a preposition or a

particle: all three verbs were used in sentences where *with* was a clear preposition (7, 8, 9, 10, 11, 12). For example, *They are leaving on a great adventure; you should go with them.* Additional sentences, which contain a clear particle, according to a syntactic analysis (1, 2, 3, 4, 5, 6) were included, e.g, *They are leaving on a great adventure; you should go with*. Finally, the sentences were presented in the interrogative form with both a preposition and particle (1, 3, 6, 8, 9, 12) (in future studies, these might be used to ensure that it is not simply the illocutionary force that determines the prosodic cues, but these also function as "distraction" sentences to the intent of the current investigation). The standard example of this type of interrogative is the sentence that precipitated this study: *Do you want to come with?* and its prepositional counterpart, *Do you want to come with me?*

Ultimately, I chose this method of presenting the sentences based on the understanding that varying the syntactic structure of read materials has been used successfully to encourage systematic variation in prosodic constituent structure in many types of experimental study (e.g, Lehiste, 1973; Scott, 1982; Fougeron and Keating, 1997). In the creation of the sentences, like in most related studies, every effort was made for compared sentences to contain the same, or at least similar segmental material, and similar numbers of words and syllables within each utterance (Ito and Speer, 2006: 21-22). Of course, adding an object pronoun following the *with* preposition element created longer, but similar sentences.

Based on the recommendation of Ito and Speer (2006), I crafted very simple and non-specific instructions regarding the reading of the test sentences. Ito and Speer believe that it is best practice to avoid the use of explicit instruction to elicit desired prosodic structures, where these instructions could have the undesired effect of getting talkers to exaggerate or to produce patterns or contrasts that they would not normally produce (Ito and Speer, 2006: 23). Consequently, when presented with the sentences and the reading task, participants were asked to read the following short instructions, which mentioned nothing about the actual objective of the experiment, but rather allowed participants to gain confidence about their reading of the sentences: *For each of the following sentences, please 1) read it silently in your head to ensure fluent production, then 2) read it aloud with a lively voice and good articulation (this will be recorded).* Further, participants were asked to complete a questionnaire that asked some demographic questions, as well as some questions about education, residence, and linguistic knowledge; this yielded the demographic information discussed in section 3.1, above.

3.3. Procedures, methods, technologies

For this initial pilot study, sentences were presented to participants in writing, and speakers were asked to read them. Prior to pronouncing (reading) each sentence, speakers were asked to read silently in their heads to obviate false starts, pauses, the need to re-record, and the like. Further, by reading sentences to themselves, the confidence of the readers was bound to increase, allowing for greater individual use of prosodic cues to demarcate the syntactic categories I hypothesize above.

Each speaker was recorded individually in a distraction-free, sound-proofed room with a Sony ICD-P520 Digital IC Recorder. Further, the Sony ICD-P520 comes equipped with Digital Voice Editor Software, which makes possible the exportation of sound files to a Microsoft Windows compatible machine (e.g, XP). Digital Voice Editor further allows for the transfer of file type from the digital recorder's Memory Stick Voice (MSV) format to one of the Praat preferred file types, WAV. Once files were converted into WAV format, they were uploaded into

Praat for a thorough acoustic analysis, as per the above discussion. In sum, for each file, which consists of the twelve spoken sentences, I 1) recorded the speakers, 2) transferred the files onto a Windows XP computer with the Digital Voice Editor Software, 3) converted and saved all files in WAV format, and 4) uploaded all files into the most current version, 4.6.24, of Praat for further analysis.

In Praat, I had some substantial editing to complete in order to isolate the segments (words) relevant to the current study. First, because all twelve sentences were recorded as one file for each speaker, I needed to edit each and create a specific file for each sentence by "extracting a selected sound (time from 0)" into the Praat Objects window. I chose to extract with "time from 0" so that I could measure the relative duration of the tone-length unit of *with* as discussed in section 2.4, above. Further, I determined that I would only extract the declarative sentences for this pilot study, as the additional pitch contours on the interrogative sentences may play a role in the overall analysis—something I wanted to avoid, if possible. Once this was accomplished for all twelve speakers and the six declarative sentences (with 3 particles and 3 prepositions), I edited each file to include the verb (come, go, ride) and the segment in question, *with*. The choice to include the verb was a practical one, as it was not measured for any of the four acoustic characteristics; it simply assisted in the analysis so I might know which segment I was dealing with.

Once all 72 segments were edited and extracted into the Praat Objects window, I began to analyze each of the segments. For each *with*, I analyzed and recorded the "intensity" (amplitude/loudness), e.g, *with* as a particle and *with* as a preposition for all three verbs. Next, I inspected the F0—fundamental frequency—or minimum pitch for the selected area (*with*), and recorded it based on its verb and speaker group. I also examined the overall pitch (mean pitch in the selection) for all seventy-two language segments, demarcating whether the data represented the particle or preposition, and for which group of speakers. Finally, I determined the tone-unit length or duration by reading the number of the selected *with* duration, as reported on the bottom bar of the Praat Object window, and recorded it in the same manner as the other data. In order to ensure accuracy of calculation, all of the data were entered into a Microsoft Excel, 2007 document. For each of the respective categories of prosodic cue (i.e, tone-unit length, F0, average pitch, and intensity), I averaged the study participant data for 1) individual variables, 2) speaker, 3) *with* category, and 4) accompanying verb. As illustrated in Figure 6 of Appendix I, for each of the aforementioned categories of prosodic cue, I averaged and recorded data for six variables—three verbs (come, go, ride) and the accompanying particle and preposition (2). Further, the data were separated by speaker dialect area: Minnesota or Other/non-Minnesota. In total, this averaging and recording yielded a chart containing eight rows (participants and prosodic cue) and six columns (*with* as a particle and preposition with each of the three verbs—48 cells in all). Each row of the chart consists of an averaging of one prosodic cue (e.g, tone-unit length) for both particles and prepositions—for all three verbs. This analysis produced the raw averages seen in the Figure 6 in Appendix I.

After the averages of all variables were calculated and recorded (and double checked for consistency), I completed a further analysis, which compared the two dialects in an attempt to reveal the answer to the question, *Can prosodic cues accurately identify constituent boundaries with cross-dialectal homophones?* Further, by comparing these two dialects and their production of *with*, I hope to illustrate that it is, in fact, a particle for Minnesota speakers, as demarcated by the examined prosodic cues, and that those cues help to disambiguate it (syntactically, categorially). Further, in so doing, I aim to illustrate that the *X with* (verb + particle) construction

exists in Minnesota and not in Other/non-Minnesota Dialect areas (at least not to the same extent).

Specifically, in order to calculate this hypothesized difference, I recorded the average numbers for each prosodic cue for 1) particles, and 2) prepositions into Excel for each dialect group, e.g, for Fundamental Frequency (F0), I recorded the three particle statistics (one for each verb) and the three preposition statistics. Then, I subtracted the preposition number from the particle number (as particles receive more stress, according to the literature) for each. Finally, I averaged the results of that difference, yielding one total difference for each of the prosodic cues for each of the dialects (4 numbers for Minnesota difference between particles and prepositions; 4 numbers for Other/non-Minnesota speaker difference), as illustrated in Figure 2, in section 4 of this document.

4. Discussion of Praat results

Participants' overall performance, as illustrated in Figure 2, indicates results that appear to agree with the hypothesis of this investigation: In all but one of the four prosodic cue categories, the difference between the amount of stress, intonation, and prosodic weight given to particle *with* as opposed to preposition *with* illustrates that Minnesotans make a definite distinction between these two syntactic categories.

	Minnesotan Speakers	Non-Minnesotan Speakers
Tone-unit Length/Duration (in *Seconds*)	0.1809	0.1709
F0-Fundamental Frequency (in *Hertz*)	25.4143	-10.4863
Pitch Frequency (in *Hertz*)	22.3596	-15.9028
Intensity/Amplitude (in *Decibels*)	-0.3706	-1.6192

Figure 2: Overall average difference between particles and prepositions for speakers

The overall average tone-unit length/duration difference between the particle *with* and preposition *with* for the two groups illustrates a slight amount of extended length for Minnesota speakers over Other/non-Minnesotan: When uttering *with,* Minnesotans had an average of a 0.180937 second longer *with*, as compared to a 0.170943 difference for the Other/non-Minnesotan speakers. These results are represented visually in Figure 3, below.

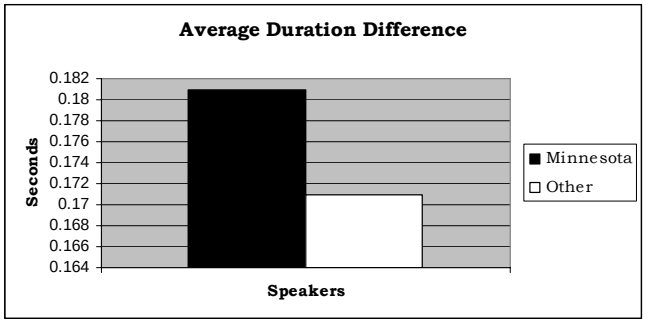

Figure 3: Duration average difference in seconds

Overall, this disparity is hardly significant, and certainly not enough to warrant a clear answer to the question regarding *with*'s constituency in these dialects. As stated previously, it seems as though the design of the test sentences may have had some bearing on the proportionate lengthening of *with* in particle position for both groups; placing the *with* at the end of the sentences (regardless of it being a particle or preposition) is sure to solicit a greater duration. Although, the data do yield the hypothesized relationship—that *with* as a particle will have greater stress/duration.

In contrast to duration, when closely examining pitch, as illustrated by frequency, a substantial difference becomes clear. Both the F0 average difference (Figure 4) and the overall pitch frequency discrepancy are significantly in favor of the hypothesis. The average difference between the particle *with*—for which a higher F0 is expected—and the preposition was nearly 36 Hertz apart. The difference for Minnesota speakers was an average of 25.4143 Hertz, illustrating that in this dialect, *with* (in particle position) receives a greater amount of prosodic attention.

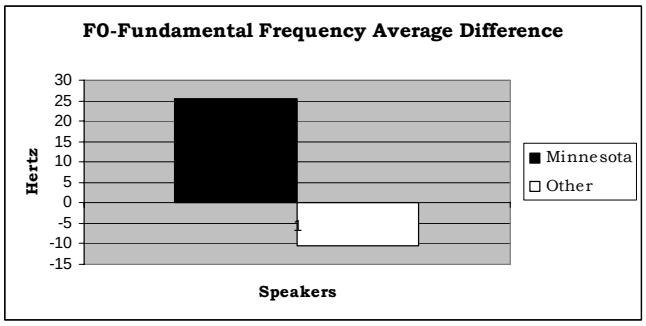

Figure 4: F0-fundamental frequency average difference in hertz

On the other hand, Other speakers presented an opposite effect: the difference between the particle and preposition for those speakers runs counter to expectation. On average, speakers of this dialect illustrated a -10.4863 Hertz difference—they actually affix a greater fundamental frequency to prepositions than to particles (in this *with* context). Thus, it is a distinct possibility that the proposed syntactic structures (Figure 1) likely exist in the grammars of these dialects; non-Minnesotans do not apply a prosodic cue to *with* in the particle context to demarcate it from the preposition—possibly because they don't process it as such.

An even stronger, albeit related correlate, becomes manifest through the pitch frequency analysis of these variables. Particles, which lie at the right edge of constituency (XP) boundaries, are predicted to garner a higher overall pitch frequency, as they are stressed by speakers of English. This expectation is met with the analysis of these syntactic elements: the average pitch frequency difference between particles and prepositions for Minnesota speakers is 22.3596 Hertz. In contrast, non-Minnesotans—in a similar fashion to the F0 analysis—produced a greater pitch frequency for prepositions, yielding a negative (-15.9028 Hertz) difference from the expected outcome, if they were demarcating a particle (Figure 5, below).

Therefore, one might conclude that Minnesotans do more clearly differentiate and, consequently, disambiguate these syntactic homophones with pitch. In all, it is the pitch frequency (coupled with F0, which is directly related) that functions as evidence for the hypothesized classification of *with* in these dialects.

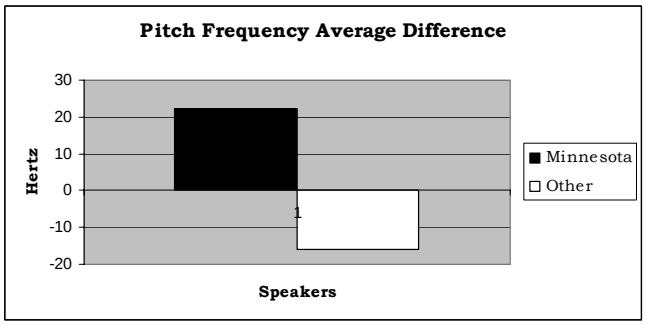

Figure 5: Pitch frequency average difference in hertz

The final prosodic characteristic analyzed for this study is that of intensity or amplitude. Unfortunately, the results of this aspect of the investigation have yielded evidence that contradicts the expected relationship (according to the literature) regarding the correlation between amplitude and particle and preposition delineation. In fact, for both participant groups, prepositions exhibited greater intensity. Minnesota speakers differed, favoring prepositions, by 0.3706 (-0.376, according to expectation). Non-Minnesotans differed by -1.6192, which also illustrates greater intensity for prepositions. Reasons for this unexpected result may range from the sentence make-up to the number of participants, to the object that directly follows the preposition, which may function to increase intensity as speakers prepare to utter another word. Nonetheless, as discussed previously, intensity is the least important and most inconsistent of the prosodic features. Thus, it might simply be dismissed as study error.

5. Conclusions: *with* as a particle for Minnesotans

This pilot study indicates that prosodic cues/boundaries are quite informative for syntactic constituency delineation across dialects. Specifically, F0 and pitch frequency illustrate that *with*, as attached to the verbs of movement *come, go,* and *ride* is a particle and not a preposition (as posited by a variety of language scholars). Further, the fact that non-Minnesotans illustrate a negative (in terms of expectation) pitch difference—relegating greater stress to the preposition than to the particle—further illustrates 1) the ability of prosodic cues to differentiate constituents, and 2) that non-Minnesotans process the *X with* construction, with no surface object, as a verb followed by a preposition. These speakers appear not to have acquired *with* as a particle and are thus unable to disambiguate the syntax of this homophone, labeling all *with* structures (in this limited set) as prepositions.

Further investigation, with reformed sentences which position *with* at the end of phrases, but word medially, will gather data from a larger participant pool. Further, in order to more thoroughly address pitch and contour, I will do an analysis of the interrogative constructions as well. With these alterations to the study methodology, the results herein are bound to be strengthened, garnering favorable results in both duration and amplitude prosodic cues.

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Appendix I

	come with		**go with**		**ride with**	
	Particle	*Preposition*	*Particle*	*Preposition*	*Particle*	*Preposition*
Tone-unit length Average in *Seconds* (Minnesotan)	0.40449	0.22703	0.46199	0.26031	0.36196	0.24829
Tone-unit length Average in *Seconds* (Others)	0.37496	0.17609	0.42167	0.20193	0.28386	0.18964
Fundamental Frequency Average in *Hertz* (Minnesotan)	119.5444	119.9941	181.3306	94.02488	131.6768	142.2898
Fundamental Frequency Average in *Hertz* (Others)	99.4034	106.7227	102.5044	108.5119	108.8184	126.9504
Pitch Frequency Average in *Hertz* (Minnesotan)	168.7449	161.3232	194.0226	152.8997	170.5291	151.9947
Pitch Frequency Average in *Hertz* (Others)	125.2835	144.7394	119.6309	112.1597	120.4485	156.1723
Amplitude/Loudness Average in *Decibels* (Minnesotan)	76.9643	77.0317	75.8384	76.5306	77.4254	77.7777
Amplitude/Loudness Average in *Decibels* (Others)	71.8310	73.5581	71.6659	74.2762	74.6653	75.1856

Figure 6: Results of average prosodic measurement of all speakers