1. INTRODUCTION AND METHODS

THIS MONOGRAPH FOLLOWS a small but growing body of acoustic studies of dialectal variation in American English vowels. Within sociolinguistics, acoustic measurement is beginning to encroach upon impressionistic transcription as the analysis technique of choice for vowel production. The seminal socioacoustic work was by Labov, Yaeger, and Steiner (1972), who examined vowel shifting patterns in the Great Lakes region and in the South, as well as in several other areas, such as New York City, southeastern England, and Scotland. They named four patterns of vowel shifting observed across different languages and established several principles for vowel shifting that were later refined by Labov (1991, 1994). They also described two chain-shifting patterns of vowels that occur in American English: the Northern Cities Shift and the Southern Shift. Briefly, the Northern Cities Shift, which occurs in the Great Lakes region (especially in large urban centers), involves raising of /æ/ to [eə], fronting of /ɑ/ to [a ~ æ], unrounding of /ɔ/ to [ɑ], backing of /ʌ/ to [ɔ], backing of /ɛ/ to [ʌ] or lowering toward [a], and sometimes lowering or backing of /ɪ/. The Southern Shift includes fronting of /u/, /ʊ/, and /o/; lowering of the nuclei of /e/ and /o/ and sometimes of the nuclei of /i/ and /u/; fronting and raising of /ɪ/ and /ɛ/; and either monophthongization of /ai/ to [aː] or backing of the /ai/ nucleus to produce [ɑ˃i ~ ɒi].

Several other acoustic studies by Labov and his colleagues at the University of Pennsylvania have appeared as well. A number of these papers are investigations of the Philadelphia dialect, including Graff, Labov, and Harris's (1986) comparison of white and African American speech in Philadelphia; Labov's (1980) study of the direction of vowel changes in Philadelphia; Hindle's (1980) analysis of /æ/ spoken by a woman from Philadelphia; Labov, Karen, and Miller's (1991) study of the near-merger of words such as *ferry* and *furry*; Kroch's (1996) study of upper-class speech; and Roberts's (1997) study of the acquisition of the dialect by children.

Other acoustic studies produced by this team include Herold's (1990) analysis of the merger of /ɑ/ and /ɔ/ in the Scranton/Wilkes-Barre, Pennsylvania, area; Veatch's (1991) analysis of the vowels of four very different dialects of English; Ash's (1996) analysis of /u/ fronting in the Midwest; and Labov and Ash's (1997) examination of cross-dialectal perception. Most recently, this research group has been conducting the Telephone Survey of Sound Change in Progress in North American English (TELSUR; Labov, Ash, and Boberg 1997, forthcoming). This project aims to plot numerous vowel shifts across the United States and Canada and is the first systematic and comprehensive continent-wide survey of American dialects to use acoustic data. It has already yielded a great deal of useful information on, for example, exactly where the merger of /ɑ/ and /ɔ/ occurs. A spinoff article is Boberg's (2000) comparison of vowel configurations along the United States/Canada border. Information on and updated findings from TELSUR can be found at the home page for the Phonological Atlas of North America (http://www.ling.upenn.edu/phono_atlas/home.html).

A number of other researchers have conducted acoustic research on vowels of American English. An early study was Habick's (1980) dissertation on the fronting of /o/, /ʊ/, and /u/ in Farmer City, Illinois (see also Habick 1993). Feagin (1986) compared the vowels of different generations of natives of Anniston, Alabama. Di Paolo and Faber (1990), Di Paolo (1992), Faber (1992), and Faber and Di Paolo (1995) investigated how phonation could be used to maintain vowel distinctions in Utah English that were not realized as formant differences. Esling (1991) and Esling and Warkentyne (1993) examined the social differentiation of vowel variants in Vancouver, British Columbia, the latter study focusing on the retraction of /æ/. Clarke, Elms, and Youssef (1995) included a few formant plots in their otherwise impressionistic study of vowel shifting in Canadian English. Schilling-Estes (1996) and Schilling-Estes and Wolfram (1997) compared vowel changes in two insular communities, Ocracoke, North Carolina, and Smith Island, Maryland. Wolfram, Hazen, and Schilling-Estes (1999) examined local variants of /ai/ and /ɔ/ in Ocracoke and another North Carolina coastal community, Harkers Island. Niedzielski (1996) analyzed Canadian raising of /au/ (which produces realizations such as [ʌu]) in the Detroit area. Ito and Preston (1998) and Ito (1999) examined the spread of the Northern Cities Shift in rural parts of Michigan. Fridland (1998, 2000) conducted a detailed analysis of vowel shifts among whites in Memphis.

There have also been a few acoustic studies of the vowels of African Americans and Mexican Americans. Graff, Labov, and Harris (1986) provided comparative vowel formant plots of a white and an African American Philadelphian. Deser (1990) examined /ai/, /æ/, and vowel duration within African American families from Detroit, finding some correlation between children's realizations of these variables and whether the parents were natives of Detroit or the South. Denning (1989) traced the shift from [ɪ] to [i] in unstressed syllables (e.g., in *happy*) among African Americans in East Palo Alto, California; his study was primarily impressionistic, but he included acoustic data for comparison. Godinez (1984) and Godinez and Maddieson (1985) compared the vowels of Mexican Americans and Anglos in Los Angeles. Fought (1999) examined how vowel realizations are correlated with gang affiliation among Mexican Americans in Los Angeles. Veatch (1991) and Patrick (1996) examined Jamaican vowels acoustically.

Finally, much of my own previous research has involved acoustic analysis of vowels. Thomas (1991) inquires into the origin of Canadian raising. Thomas and Bailey (1992) investigates the /ɑr/-/ɔr/ and /ɔr/-/or/ mergers in Texas. Thomas (1993) describes vowel variants in Mexican American English. More recent work includes an investigation of how phonetic factors led to dialectal differences in /ai/ (Thomas 1995); a study of the role of individuation in linguistic changes in Johnstown, Ohio (Thomas 1996); a comparison of /ai/ and /e/ realizations among rural and metropolitan Anglo Texans (Thomas 1997); two studies of the history of African American Vernacular English vowels (Thomas and Bailey 1998; Bailey and Thomas 1998); a comparative study of African American and white vernaculars in Hyde County, North Carolina (Wolfram, Thomas, and Green 2000; Wolfram and Thomas forthcoming); and a study comparing production and perception of pre-/t/ and pre-/d/ /ai/ glides of white Anglos from Ohio and Mexican Americans from Texas (Thomas 2000).

1.1. ORGANIZATION AND SYMBOLS USED

This collection is organized to emphasize the most salient dialectal divisions that occur among the speakers that are included. For this reason, speakers are divided first by ethnicity, second by geography, and third by year of birth. Linguistic differences that follow other factors, such as socioeconomic group, gender, and personal aspirations, are beyond the scope of this work, as are intraspeaker differences such as style and register variation. Special groupings are made occasionally for speakers who show unusual patterns, such as African Americans from the Pamlico Sound area or Mexican Americans who show considerable assimilation to Anglo speech. Descriptions of the general features of the dialects covered are given in the introductions to chapters 3–8. For each speaker, a short demographic description is provided, followed by some distinctive "field marks" of the person's speech. The hometown listed indicates where the speaker grew up; a few lived in different communities as adults.

For those not familiar with vowel formant plots, the squares and lines can look like gobbledygook. The numbers representing Hertz (Hz) on the horizontal and vertical axes can be misleading as well. The following tips should help readers. First, the Hz readings are best ignored. They vary with a speaker's mouth size, and listeners' auditory systems normalize them. What is important is where a vowel appears relative to the speaker's vowel system as a whole: for example, is the /o/ of *coat* more backed (on the right half of the vowel system) or more fronted (on the left side)? Second, a useful method of familiarizing oneself with vowel formant plots is to focus on a particular vowel, such as /o/, and follow it across many different plots. By looking at enough plots, one can see that younger speakers tend to have fronter /o/s than older speakers and whites tend to have fronter /o/s than African Americans or Mexican Americans. Tracing several vowels in this manner should make dialectal patterns evident and should initiate readers into the spatial "language" of vowel plots. Third, the text is designed to point out the salient features of different dialects and idiolects. As noted earlier, the descriptions at the beginning of chapters 3–8 discuss the features that characterize each dialect depicted in the plots. The descriptions below the vowel plots point out important features of individual speakers' vowels, such as particular mergers that a speaker has. These descriptions should help the reader to focus on what is dialectally distinctive in a given vowel plot.

Throughout this work, F1 refers to the first formant, F2 to the second formant, F3 to the third formant, and f_0 to the fundamental frequency, as is conventional in acoustic phonetics. Symbols in brackets (e.g., [ei]) stand for phonetic realizations. The most recent (1993) version of the International Phonetic Alphabet (see appendix B) is followed, with a few exceptions: I use [ü] instead of [y] to avoid possible confusion with the palatal approximant, and I use the shift symbols [˅˄˃˂] instead of [˕˔˗˖] because they are more familiar to most readers.

The symbols for vowel phonemes are enclosed in slashes (e.g., /e/) in the text, but not on the plots. They are listed in table 1.1 with an example word for each. These symbols are used because most of them are conventional symbols for the vowels of American English. For /ai/, /au/, and /oi/, I have designated the glide with [i] or [u]

TABLE 1.1
Vowel Symbols

/i/, as in *eat*	/ɪ/, as in *zip*
/e/, as in *day*	/ɛ/, as in *check*
/æ/, as in *back*	/ɑ/, as in *cot*
/ɔ/, as in *caught*	/ʌ/, as in *cut*
/o/, as in *coat* or *towed*	/ʊ/, as in *hook*
/u/, as in *do*	/ai/, as in *size*
/au/, as in *how*	/oi/, as in *boy*
/ɜ/, as in *first* (when *r*-less)	/r̩/, as in *first* (when *r*-ful)
/æ:/, as in *pass* or *half,* where it differs from the vowel in *back, pad,* or *have*	/ɵ/, as in *coat* or *toad,* when it is distinct from the vowel in *towed* (in old-fashioned New England speech)
/ir/, as in *hear*	/er/, as in *hair*
/ɑr/, as in *hard*	/ɔr/, as in *horse*
/or/, as in *hoarse*	/ur/, as in *tour*
/air/, as in *tire*	/aur/, as in *tower*

instead of with a semivowel symbol because most speakers of English treat them as a single vocalic unit, not as a sequence of a vowel and a semivowel. However, I did not attempt to create a unitary symbol for any of these diphthongs because such a contrived symbol would make it harder for readers to recognize what sound I was referring to. Otherwise, the symbols are not intended to imply any particular phonological content. They are intended to represent a set of diaphones that are historically connected. The arbitrariness of the actual symbol used is exemplified by /ɑr/, which I use for the sequence in *hard* even for Newfoundland English, which preserves a form with the vowel [æ] that is older than the form with [ɑ]. While it is possible to use symbols that are supposed to represent phonological relationships, I find it pointless to do so. For example, one could use /o/ instead of /ɑ/ for the vowel in *cot* because of the relationship between words such as *cone* and *conical.* As Ohala (1992) points out, however, the relationships between many such words with sound alternations are more opaque to speakers than phonologists have generally acknowledged (e.g., in *suppose* and *suppository*). They are also less productive than many have assumed: nonlinguists who are asked to create new words from existing words and affixes tend not to employ the alternations (see Ohala 1974, 1992). I suspect that most nonlinguists, when asked—for example—to add *-ical* or *-itory* to a nonsense word like *sustose* /səstoz/, would produce *sustosical* and *sustository* with the vowel of *coat,* not the vowel of *cot.* Thus, it is questionable whether there is any real synchronic connection between the vowels of *cot* and *coat.* It is better to use arbitrary symbols than to use symbols that are tied to phonological theories that may become outdated.

I have chosen not to give lists of vowel realizations of the sort found in Wells (1982), with a keyword for each class (e.g., *face* for /e/) and a typical realization for a vowel in each dialect. The keywords are more important for British dialects than for American dialects because of the greater variability in British dialects. Lists of typical realizations would defeat one of the principle aims of this work, which is to show diachronic changes and other variations *within* particular dialects.

Superscript annotations are added to phonemic symbols to indicate particular phonetic contexts. These notations are listed in the following column. The first three follow Labov, Yeager, and Steiner (1972), except that I use $\square^{v}$ strictly for vowels before voiced obstruents.

$\square^{o}$	before a voiceless obstruent
$\square^{v}$	before a voiced obstruent
$\square^{N}$	before a nasal
$\square^{\#}$	word-final
$\square^{r}$	before /r/
$\square^{l}$	before /l/
$\square^{g}$	before /g/
$\square^{d}$	before /d/
$\square^{F}$	before a voiceless fricative
$\square^{t}$	before /t/
$\square^{ptk}$	before /p/, /t/, or /k/

When two or three superscript symbols are used together, it means either or any of those contexts: for example, /$au^{v\#N}$/ refers to /au/ when it is pre–voiced obstruent, word-final, OR prenasal. When a vowel symbol is used on a formant plot with a full-size consonant symbol, it means that the consonant is shown as well as the vowel; for example, *ul* on a plot (as opposed to u^{l}) indicates that the /l/ glide is shown, while *er* for an *r*-less speaker indicates that the schwa-glide is shown. Two vowel symbols separated by an equal sign indicate that the two vowels are merged for that speaker. For instance, /ɑ = ɔ/ refers to the vowel resulting from the merger of /ɑ/ and /ɔ/. Determinations of whether a speaker merged two vowels were based on both the acoustic measurements and on my impressionistic judgment from listening to the tokens. Many of the speakers read minimal pairs, and their production of the minimal pairs was also taken into consideration. Obviously, the judgments are supposed to represent speakers' production, not their perception. At times it was not completely clear whether a speaker showed a merger or not. In such cases, the judgments represent the weight of the evidence.

The filled squares on the formant plots indicate the mean value of the tokens that were measured for that particular vowel. In some cases where several vowels occur in the same area, small dots appear on the plot to link the square with its label. Arrows are used for diphthongs; the square indicates the nucleus of the diphthong and the arrow point marks the mean value of the glide. Phonetic symbols are always placed near the nucleus of a diphthong. Occasionally, when it is difficult to follow a diphthong from nucleus to glide on a plot, a smaller version of the same symbol is placed near the glide.

The use of mean values allows the gliding of diphthongs to be shown. The glides of diphthongs have often been neglected in past sociophonetic studies, but they are vital to understanding dialectal variation and sound change. Showing each token of a vowel would make the plots too cluttered to depict both the nucleus and the glide of diphthongs. Error bars that depict the standard deviation might seem at first to offer a way of showing the degree of spread of the individual tokens, but I have chosen not to use them for two reasons. First, error bars would still clutter the plots to the point that they would be hard to read. This factor would not be too much of a problem if I were showing only monophthongs and nuclei of diphthongs, but with diphthong glides included, there would simply be too many lines on the plots.

Second, the nature of the data makes error bars deceptive. Although the standard deviation is not, of course, a function of whether the data show a normal or skewed distribution, error bars leave the visual impression with readers that the data have a normal distribution. Because of the effects of different adjacent consonants, the effects of variations in duration and stress, and the limiting effect of the margin of the vowel envelope, however, the distribution of tokens is almost always skewed. Furthermore, if the sample of tokens is biased toward phonetic contexts that cause, for example, lowering of F2, the bias may not be reflected in the error bars. Thus, generally speaking, information about the phonetic context and duration of tokens should tell researchers more than the standard deviation would, especially when the number of tokens is small. Although space limitations preclude listing this information (since 150–200 vowels were measured for most speakers), I have attempted to compensate by regularly excluding vowels in contexts that show the greatest consonantal influence—for example, front vowels before /g/, vowels before /l/ (except where considered separately), and (usually) vowels after /w/ and /j/. Vowels do not all show the same degree of spread of tokens, but these differences are to some degree predictable. /u/, for example, typically shows a wide range of F2 values, either because its articulatory position makes it particularly susceptible to coarticulatory influence (see Ohala 1981) or because it lies in a region in which a small articulatory difference translates into a large acoustic difference (see Stevens 1989), or both. Diphthongs also typically show a wide range of formant values because durational variations can cause large fluctuations in the amount of truncation that they exhibit. Recognition of these predictable effects should reduce the need for error bars.

Another argument for error bars is that speakers of a dialect may show greater variation in their production of a vowel when it is shifting in that dialect (as implied in Labov, Yeager, and Steiner 1972, 79–91, and Labov 1991, 14; 1994, 158). That is, speakers may develop extensive allophonic conditioning during a shift, or they may have more variants at their disposal to use for stylistic purposes. This notion may be true to some extent, but it is easy to overstate the case for it, and some of the evidence cited for it can be explained in other ways. For example, Labov cites a Buffalo, New York, native who shows the Northern Cities Shift fronting of /ɑ/ and says that certain of her tokens of /ɑ/ are leading the shift, among which "the word *got* is the most characteristic of these: it is the leading element in the fronting" and that, in isolation, the vowel in *got* sounds more like [ɛ] (Labov 1994, 183). However, the vowel in *got* shows considerably higher F2 values than most other examples of /ɑ/ in any dialect, including those in which /ɑ/ is being merged with /ɔ/ and thus may be undergoing BACKING as well as those in which /ɑ/ is stable. What is needed are controlled acoustic studies demonstrating specifically that vowels really do show a wider range of formant values when they are undergoing shifting (though see Hindle 1980). At any rate, error bars showing the standard deviation cannot distinguish between this sort of vowel shift-related spread of formant values and spread caused by the phonetic contexts of the tokens that were measured.

Nevertheless, it should be remembered that any mean value has a margin of error. When reading the vowel plots, one should not take the exact placement of a vowel too seriously but instead should consider the mean values to be in the right neighborhood. The usual 7–10 tokens measured for a particular vowel by a particular speaker are not a large number, and a different sample of tokens by the same person would yield a somewhat different mean. The phonetic contexts of the tokens can have a noticeable effect on the mean value, especially if they are strongly skewed in some way. I took steps to reduce such skewing, however, by excluding certain contexts that show an especially strong coarticulatory effect (as noted above) and, with few exceptions, by measuring no more than two examples of the same word. In fact, it is not possible to determine a single definitive spot at which a vowel truly lies because the context pervades all aspects of vowel production. For example, should the definitive form of a vowel be the production in isolation, which usually (barring stereotyping of certain variants) represents a "target" value, or the production in connected speech, which usually shows some reduction? If certain words that contain a particular vowel are far more common than other words with that vowel (as is the case with /au/, for which *out*, *about*, *how*, *now*, *down*, *around*, and *house* are by far most frequent), should those words be considered most representative of that vowel, or should a context-neutral value be the goal?

All of the vowels are shown on each plot except for a few of the archival recordings, for which there were no tokens of some of the less common vowels (especially /oi/). The glides of /i/ and /u/, which are usually minimal, are not shown for all speakers. Vowels before /l/ are not shown except where they are relevant to pre-/l/ mergers or to the overall configuration of the vowel system. /er/, /ir/, and stressed syllabic /r/ are omitted for the majority of speakers, largely because I did not recognize their dialectal importance in the earlier stages of the acoustic measurement. /r/-glides, schwaglides in *r*-less varieties, /l/-glides, and the glides of /æ^{N}/ are seldom shown because they would have cluttered the plots too much.

In the note accompanying the plot for each speaker, speakers from the *Dictionary of American Regional English* (*DARE*) are identified by their *DARE* label (e.g., *DARE* OH 015). "Completely *r*-less" refers only to syllable rhymes, not to syllable onsets or intervocalic /r/. At the end of the note, two labels are found. The first indicates whether the analysis is based on conversational speech, reading passage speech, or both. This information is included because its importance for stylistic variation is so well established now. Tokens from word lists were never included except for a very few tokens of /ai/ and /au/ for speaker 1. The second label indicates where the analysis was conducted: the Bioacoustics Laboratory at Texas A&M University (TAMU), the Linguistics Laboratory at the University of Texas at Austin (UT), or the William C. Friday Linguistics Laboratory at North Carolina State University (NCSU) (see §1.2).

1.2. METHODS OF ACOUSTIC ANALYSIS

It is futile to try to list the models of recording devices on which the recordings analyzed in this work were created. The recordings came from a wide variety of sources, including several sociolinguistic surveys and a number of archives. For some of them, the type of recording device used is unknown.

I conducted all analyses of speakers myself except for those from Graham County, North Carolina (speakers 64–66 and 192), and two from Hyde County, North Carolina (speakers 152 and 155), which were conducted by Bridget Anderson. Measurements taken at Texas A&M University or at the University of Texas at Austin (except for speakers 10, 14, 27, and 55) were made with a Kay Sonagraph, model 5500. Measurements taken at North Carolina State University were made with a Kay Computerized Speech Laboratory (CSL), model 4300B. For both the Sonagraph 5500 and the CSL, signals were digitized at a sampling rate of 10 kHz with 16-bit resolution and Blackman windowing and were lowpass filtered at 4 kHz, with 6 dB/oct preemphasis at a factor of 0.8.

Measurements for speakers 10, 14, 27, and 55 were taken with a VaxStation II/GPX at the University of Texas; signal processing was identical to that of the Sonagraph 5500 and the CSL except that the preemphasis occurred at a factor of 0.85.

Spectrographic displays of the vowels and diphthongs measured were examined in order to determine where to take formant readings. Normally a Fast Fourier Transform (FFT) frame length of 100 points was used to produce the displays, but frame lengths of 75 points were used for many of the female speakers analyzed at the University of Texas. While there are various ways to determine where to take readings, such as taking one each a quarter, a half, and three quarters through the vocoid or even creating formant tracks, the most practical method for my purposes was to take one reading for a monophthong, two for a diphthong, and three for a triphthong. Measurements were taken in the center of the vowel for monophthongs. For diphthongs, the methods used at Texas A&M University and the University of Texas and those used at North Carolina State University differed slightly. At Texas A&M and the University of Texas, readings were taken in the center of steady states, or where F2 changed trajectory if no steady state was present (but not closer than 25 ms to the edge of the vocoid), or 25 ms from the edge of the vocoid if there was no steady state or change in F2 trajectory. The purpose of the 25-ms limit is to eliminate most of the transitional effects of adjacent segments. At North Carolina State, median linear predictive coding (LPC) values were taken for the region between 25 and 45 ms from the beginning of the vocoid for the nucleus and between 25 and 45 ms from the end for the glide. Tokens with durations of 70 ms or less were not measured as diphthongs. The effects of the two different methods on the mean values shown in the plots are small. Methods used for triphthongs were the same as for diphthongs except that a third reading was taken where the change in formant trajectory occurred, which often coincided with a steady state.

An LPC program (Atal and Hanauer 1971) was available for the Sonagraph 5500 at Texas A&M, the VaxStation at the University of Texas, and the CSL at North Carolina State, but not for the Sonagraph 5500 at the University of Texas. Formants were estimated with LPC when it was available, using the autocorrelation method. The default LPC settings are 12 coefficients for the Kay products and 14 coefficients for the VaxStation, and most LPC measurements were taken with these settings. However, anywhere from 8 to 20 coefficients were used when the default setting either failed to produce a reading for a formant or produced two readings for a single formant.

With the Sonagraph 5500 at the University of Texas, for which LPC was not available, formants were estimated from harmonic values. Harmonics were examined using FFT power spectra with a frame length of 512 points. If a single harmonic in the neighborhood of a formant had a greater amplitude than neighboring ones, its value was taken as the formant estimate. If two adjacent harmonics in the neighborhood of a formant had approximately equal amplitudes, a value halfway between them was taken as the formant estimate. This method was also used with the CSL at North Carolina State for taking follow-up measurements for speakers analyzed earlier without LPC at the University of Texas. A comparison of vowels measured with and without LPC showed that the difference in techniques did not affect the formant readings greatly (Thomas 1995). It should be remembered that readings taken with LPC, like those made with the harmonic estimation method, can be influenced by harmonic frequencies (especially when f_0 is high), though usually to a lesser extent. LPC is also susceptible to background noise.

The plots show only F1 and F2. From 1990 until 1993, when I was conducting analyses of most of the Texans, I recorded only F1 and F2 values. In 1993, when I turned to analyses of Ohioans, I began recording F3 as well. Since 1996, the period when most of the North Carolinians were analyzed, I have regularly recorded f_0, too. F3 is important largely for lip rounding, /r/-coloring, /l/-coloring, certain other consonant transitions, and certain vowel normalization techniques, while f_0 is important for phonation and some normalization techniques, as well as, of course, various prosodic functions.

Ordinarily, seven to ten tokens of each vowel were measured. However, for some of the less-frequent vowels, such as /oi/ and /ʊ/, and for some of the vowels in special contexts, such as /er/ and /ul/, fewer than seven tokens were available in most cases, and the mean values are based on whatever tokens were present. In addition, some of the archival recordings used were rather short and did not contain the desired number of tokens. When possible, all the tokens were of different lexical items, and with only a few exceptions, no more than two tokens of the same lexical item were measured. When only one token of a vowel class was measured, the word is shown on the formant plot inside angled brackets (e.g., <tour>).