Scat Singing: A Timbral and Phonemic Analysis*

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Jazz, especially the bop-derived styles to which that term now largely refers, is generally considered an instrumental idiom; far less often the term "jazz musician" conjures up an image of a singer. In this context, scat singing, the usual medium for jazz vocal improvisation, is usually understood as singers imitating instrumentalists (e.g., Robinson 1994:1093). There is ample evidence for this view. As Milton Stewart has shown, the vocables used by such notable exponents of scat as Ella Fitzgerald and Sarah Vaughan often mimic the tonguing, phrasing, and articulation of instrumentalists (1987:65, 68, 74). Furthermore, by dissociating the vocal line from verbal meaning, scat singers venture into the realm of so-called "absolute" music where musical sounds are apparently free of the extra-musical associations that words create, a realm typically identified with instrumental music. Jazz singers who explore this realm do so by adopting the role of the horn player in the ensemble.[1]

While acknowledging this view, Paul Berliner reminds us that the exchange of ideas between jazz players and singers has flowed abundantly in both directions (1994:125). Scattered throughout his monumental study *Thinking in Jazz* are references to instrumentalists drawing upon vocal expression and technique in both forming and communicating their musical ideas. Generalizing about the ways master musicians guide the formation of their students' musical imaginations, for example, Berliner states that, "Many experts advise learners to practice singing tunes initially with nonverbal or scat syllables—to master the melodies aurally without relying on physical expression such as fingering patterns or the visualization of an instrument's layout" (ibid.:66). Many other authors have also recognized the importance of vocal expression in instrumental jazz.[2]

Perhaps because of the extensive crossover of ideas between instrumentalists and vocalists—a crossover that has been considered by some to be a defining feature of jazz—scat singing has received little consideration as an expressive medium in its own right.[3] Indeed, there has been precious little musical analysis of jazz singing in general, let alone scat. In order to address this lacuna, my study illustrates an analytic approach to scat that grows from the distinctive features of jazz vocal performance practice. The analysis will focus largely on timbre, an important element that generally receives inadequate attention in the jazz literature.

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The idea that singers can provide us with a deeper understanding of the role timbre plays in jazz is not new. Robert Cogan offers some insight into the expressive potential timbre has for jazz singers in his spectrum analysis of Billie Holiday's 1946 recording of "Strange Fruit" (1984:35–38). A large part of Cogan's analysis is dedicated to the song's lyrics—an aspect of the performance not contributed by Holiday—so it does not have much direct bearing upon this study.[4] More relevant is Barry Kernfeld's manner of introducing jazz neophytes to the concept of timbre and how it is used in jazz. In *What to Listen for in Jazz,* Kernfeld presents listeners with the scat syllables, or vocables, of Louis Armstrong's solo from "Hotter Than That" (1995:167–68), opening up an intriguing line of inquiry. Perhaps Kernfeld was picking up on a strand initiated by Mezz Mezzrow in *Really the Blues,* when Mezzrow included a phonetic transcription of the vocables Armstrong invented for his scat solo on "Heebie Jeebies" (reprinted in Schaal 1988:3). Despite such promising beginnings, however, none of these authors explores the vocalist's manipulation of timbre in much depth.

Due to certain acoustical features of the human voice, an especially rich array of sonic resources is available to singers. The sounds singers produce fall into two broad categories depending upon whether or not they carry definite pitch. Voiced sounds, which include all vowels, are produced by sending air through the vocal cords. At the voice source these sounds are often quite complex (i.e., they contain a large number of partials), depending on their pitch and intensity. Voiceless sounds result from constricting the air flow at various places along the vocal tract, from the glottis (/h/) to the tip of the tongue (/t/). While all consonants entail some constriction of the air flow, voiced consonants such as /b/, /d/, and /g/ incorporate some definite pitch as well.[5]

As a sound proceeds through the various cavities of the vocal tract, it is modified and amplified in ways that alter its overtone structure. This process of resonation generates the formants that are characteristic of each person's voice.[6] Imposing other formants upon the sound, a singer may vary its tone color further by altering the shape of the vocal tract, which is governed by the position of the articulators—the tongue, the lips, or the jaw, for example. Articulator positions are largely responsible for the wide diversity of phones, the smallest units of speech, used by speakers and singers. Because each position produces a distinct timbre with its own radiated spectrum and characteristic formant frequencies, there are measurable differences in darkness or brightness among vocal sounds (Sundberg 1980:82–84; Taylor 1980:557–58; Cogan and Escot 1977:457–60).

The vocables singers invent when creating a scat solo are built up from phones. Using phonetic symbols, we can therefore notate the wide palette of vocal timbres available to scat singers and examine in detail how these

singers employ their sonic raw materials. Phonetic transcriptions of scat solos reveal that, for such singers, timbre serves not only to embellish melodic gestures with subtle coloristic nuances—as it often does for jazz instrumentalists—but also to organize the flow of singers' musical ideas into cohesive, dramatically effective statements.

For the analyses that follow, I have adapted the Trager-Smith phonemes (Smith 1979), which, unlike those from the International Phonetic Alphabet, are specific to the sounds of the English language (see tables 1, 2, and 3). I have chosen these phonemes because they give the reader graphic markers for several linguistic features, including a vowel's length and its brightness or darkness.[7] For example, a semi-vowel glide /y/ after a short vowel indicates the lengthening and brightening of a simple vocalic nucleus[8] that is caused by moving the tongue forward and higher (ibid.:xxviii). The timbral relationship between the words "bit" and "beat," therefore, becomes more apparent when they are spelled phonetically: the presence of a /y/ in /biyt/ (beat) indicates that the vowel is longer and brighter than the one in /bit/. Similarly, the Trager-Smith phonemes register the difference in articulator positions and sound between the words "full" and "fool." The /w/ in /fuwl/ (fool) indicates that, as the jaw moves forward and the lips round, the vowel in /ful/ (full) lengthens and darkens. Serving both as prescriptive and descriptive notations, the Trager-Smith phonemes—especially when read aloud—indicate the manipulations of the vocal apparatus necessary to produce speech sounds, in addition to notating the sound that results from such manipulations. (For a detailed look at these relationships, compare the short vowels /i/, /e/, /a/, /u/, /o/, and /æ/ in table 1 to their corresponding long vowels and diphthongs in table 2.)

The vowels in the English language can be arranged to form a timbral scale according to the relative height of each vowel's formant (Cogan and Escot 1977:459). The following sequence of vowels, produced toward the front of the mouth, gradually increases in brightness: /ə/, /æ/, /e/, /ey/, /i/, /iy/ (as in the words putt, pat, pet, paid, pit, and peat, respectively). Produced in back of the mouth, the following sequence—also starting with the neutral schwa—grows increasingly dark: /ə/, /a/, /oh/, /ow/, /u/, /uw/ (as in putt, pot, bought, boat, put, and boot). In each sequence, the addition of a semi-vowel glide /y/ or /w/ moves the preceding vowel sound one degree further on the scale. The first six rows of table 3 present alternating sets of voiceless and voiced consonants. Arranged in columns from left to right, each consonant is situated in the table according to the articulator(s) required for its production. Studying phonetic transcriptions of scat solos with these sequences in mind, we can observe the ways scat singers can create sudden timbral contrasts or smooth timbral transitions with vowels.[9]

Table 1
Trager-Smith phonemes: short vowel sounds

/i/	pit	/pit/	/ə/	cut	/cət/	/u/	put	/put/
/e/	pet	/pet/	/eh/	pail	/pehl/	/oh/	caught	/koht/
/æ/	pat	/pæt/				/a/	pot	/pat/

Table 2
Trager-Smith phonemes: long vowels and diphthongs

/iy/	beat	/biyt/	/yuw/	dispute	/dispyuwt/	/uw/	boot	/buwt/
/ey/	bait	/beyt/	/oy/	boy	/boy/	/ow/	boat	/bowt/
/ay/	bite	/bayt/				/æw/	bout	/bæwt/

Louis Armstrong's use of vocables in his influential scat performance on "Heebie Jeebies" (ex. 1)[10] illustrates how vocal timbre contributes to the music's movement and "shape" (LaRue 1970).[11] Much of the solo's playful unpredictability comes from the vocables he chooses: imagine how much less compelling the solo would be if he had sung it entirely on /la/ or some other syllable. The element of surprise is immediately heightened at the outset of the solo by the novelty of Armstrong's vocables /eh/iyf/gæf/əmf/. Initially, the freshness of these sounds serves to grab the listener's attention. But as the solo unfolds, this feature will also fulfill another purpose, which will be discussed below. In the context of the whole solo, the unusual character of these first sounds becomes even more apparent for elsewhere /d/ is the prevailing initial consonant.

The phones /d/ and /b/ used as initial consonants became the staple of virtually every scat singer who followed in Louis Armstrong's footsteps. This circumstance has more to do with the mechanics of singing into a microphone than it does either with Armstrong's direct influence or with the fact that the syllable /duw/ (doo), which horn players typically use to articulate a legato attack, begins with /d/ (Stewart 1987:65). Produced at the front of the mouth, the consonants /d/ and /b/ allow for a clear articulation of the pitch's attack—unlike their sustainable counterparts /n/ and /m/. Significantly, using the aspirated /t/ as an initial consonant has not gained much favor among scat singers, even though horn players use the syllable /tuw/ to articulate an accented sound. The puff of air released in the production of /t/ and /p/, both voiceless plosives, can produce unwanted noise when directed at a microphone.

One of the alternatives a scat singer has for accenting a pitch is to sing a relatively brighter vowel on it. Armstrong illustrates this technique in

Table 3
Trager-Smith phonemes—consonants and semi-vowel/semi-consonant glides

	bilabial	*labiodental*	*dental*	*alveolar*	*palatal*	*velar*
1.	/p/**pop** /pap/			/t/**tight** /tayt/		/k/**kick** /kik/
2.	/b/**bob** /bab/			/d/**did** /did/		/g/**gag** /gæg/
3.					/č/**church** /čurč	
4.					/j/**judge** /jəj/	
5.		/f/**fife** /fayf/	/θ/**thin** /θin/	/s/**sass** /sæs/	/š/**shush** /šəš	
6.		/v/**valve** /valv/	/ð/**this** /ðis/	/z/**z**ebra /ziybrə/	/ž/mea**s**ure /mežur/	
7.	/m/**mum** /mum/			/n/**nun** /nun/		/ŋ/**sing** /siŋ/
8.				/l/**lull** /ľəl/	/r/**rear** /rihr/	
				semi-vowel/semi-consonant glides		
		/y/yay /yey/		/h/**hah** /ha/		/w/**wow** /wæw/

measures 4–5 of example 1, using the long vowel /iy/ (ee) to highlight several of the higher pitches in the line. Conversely, he uses /uw/ (oo) to darken the tone of many of the lower pitches. Although the vocable /duw/ on the downbeat of measure 5 seems an exception to this pattern, Armstrong lends the vowel a certain brightness by modifying it slightly to resemble /dü/. His frequent alternation of contrasting vowel sounds—often such strongly contrasting ones as /iy/ and /uw/, as in measures 4–5—helps generate the movement so essential for swing.

Likewise, at the midpoint of his scat solo on "Hotter Than That" (ex. 2), Armstrong reinforces the line's contour rhythm, which results from pairs of ascending pitches, by performing a relatively brighter vowel

Example 1: "Heebie Jeebies," Louis Armstrong scat solo (February 26, 1926). Transcribed by William R. Bauer.

Example 2: "Hotter Than That," Louis Armstrong scat solo (December 13, 1929). From Reeves (2001).

on the second pitch of each pair. The momentum this treatment imparts to these note-pairs helps to propel the line along, amplifying the swing created by Armstrong's superimposition of $\frac{6}{8}$ meter against the rhythm section's common time. Sung entirely with the initial consonant /b/, the

vocables here create four-note groupings that recur every three beats, adding an additional layer of polymeter to the passage.

In "Heebie Jeebies" (ex. 1), Armstrong uses unusual scat vocables in measure 9 to draw attention to a key structural moment. The sounds he chooses for the solo's midpoint—/skiyp/skæm/ski/bəp/—recall the solo's opening measures, which share the same vowel sequence: /iy/æ/. This phonemic recapitulation reinforces the return of the opening rhythmic idea, helping to give the solo its memorable shape.[12] While there is some question concerning Armstrong's role in the origin of scat,[13] his approach to the genre undoubtedly established many of the methods explored by later scat vocalists.

One such vocalist was Betty Carter (1929–1998). Carter came of age musically when bebop arrived in Detroit in the mid-1940s. Her early exposure to the bop-oriented work of such established artists as Dizzy Gillespie, Charlie Parker, Ella Fitzgerald, and Sarah Vaughan—as well as to that of many musicians from her own generation such as Barry Harris and Tommy Flanagan—laid the groundwork for her lifelong commitment to bebop and the principles that inform it. Bebop's breakneck tempos and complex harmonic language, in addition to its use of a richly interactive rhythm section, stemmed from, and in turn spurred, musicians' quest for ever greater extremes of technical virtuosity. It is hardly surprising, then, that vocalists who sought jazz credibility were inspired by the new style to display their improvisational gifts.

Delivering a song's lyrics ostensibly limits vocalists' improvisational choices because doing so normally entails staying close enough to the melody as written that listeners can recognize it. Nevertheless, some singers transformed melodies, often boldly, while singing lyrics—especially Armstrong and Holiday, but also Sarah Vaughan at times, and, later in her career, Ella Fitzgerald.[14] Under the influence of these singers, Betty Carter was already somewhat free in her approach to a song's melody when she began her career. Still, she respected the song's essential melodic contour, restricting her full-out improvisations to scat choruses.[15] After the mid-1960s, however, she took a decidedly improvisational approach to singing lyrics, as well as to scatting.

For Carter's generation, scat had been popularized chiefly by Gillespie and Fitzgerald, performers whose scat singing helped spark the short-lived bebop craze at the end of the 1940s. By this time, the scat vocabulary had expanded beyond the outlines established by Louis Armstrong; the new rhythmic and melodic possibilities opened up by the distinctive personal styles of such singers as Cab Calloway, Leo Watson, and, later, Slim "Bulee" Gaillard precipitated a flowering of phonemic invention.[16] Their work

set the stage, in turn, for Ella Fitzgerald's bop-oriented scat singing—exemplified by her remarkable version of "Flyin' Home" (October 4, 1945)—and for Dizzy Gillespie and Kenny "Pancho" Hagood's boisterous scatting, illustrated by their renditions of "Oop-Pop-A-Da" (August 22, 1947) and "Ool-Ya-Koo" (December 30, 1947). While also grounded in the bebop idiom, Sarah Vaughan's scatting was cooler, less frantic than her predecessors'.[17]

Betty Carter's early scat singing owed much to these influences. Her earliest recorded efforts with Lionel Hampton, heard in 1948–49 on *Jubilee* broadcasts of Armed Forces Recording Service disks,[18] as well as other recordings, were peppered with references to Gillespie's scat vehicles and vocal licks out of Fitzgerald's vocabulary such as the rapid alternation of syllables that start with /n/ and /d/. In such recordings as "Confess," "I'll Dance At Your Wedding," "Nothing in View," and "Gladys's Idea," as well as "Benson's Boogie" and "The Hucklebuck," which Hampton recorded for Decca, we get a clear sense of the young singer exploring the bebop terrain via the melodic and phonemic means provided by these older singers. Carter expanded the terrain considerably in her melodically and rhythmically adventurous scat explorations from the 1960s to the end of her career. Incorporating post-bop instrumental idioms such as hard bop, these excursions in turn have been profoundly influential to a whole new generation of scat singers such as Al Jarreau and Bobby McFerrin.[19] Developments in scat have therefore paralleled those in jazz, with singers' rhythmic and melodic gestures echoing the predominant styles (Stewart 1987). As we shall see, even the choice of syllable had stylistic ramifications.

By the time the Peacock record label recorded Betty Carter's version of Randy Weston's composition "Babe's Blues," released on *Out There with Betty Carter* in 1958, she had earned the respect of the best musicians of her day. Arranger Gigi Gryce assembled and directed the band for the recording date, and trombonist Melba Liston probably arranged "Babe's Blues" for this recording.[20] Jon Hendricks's witty lyrics to the song implicitly encourage listeners to be as hip as children—who, "unlike adults," take life's hardships in stride. Hendricks's text serves largely to set an ironic, detached tone consistent with the bop aesthetic. In some ways, the nonsense syllables of Carter's scat solo also suggest a cool version of baby talk.

Isolating the vocables Carter uses in her scat solo on "Babe's Blues" (ex. 3) reveals the way she organizes them purely as timbral elements, apart from any function they may serve in relation to other musical materials. In example 3, the vocables have been arranged in lines and stanzas and punctuated in order to clarify the phrasing that results both from Carter's handling of her phonemic materials and from her approach to other musical materials such as rhythmic duration (indicated by a hori-

Example 3: "Babe's Blues," Betty Carter scat solo (1958).

	(3)	1	2	3	(1)	(2)
1.	[1:09]		*šuw*__________	*bu duw*	*bap.*	
2.			šuw__________	bu duw	bap.	
3.			*wi*__________	*di də,*		
4.		wi__________	__di bə,			
5.	wi bə,	*buw*________	bap.			
6.	duw də	wi *dl i,*	di dl *e,*	de dl ə,		
7.		*wa* dl e,	de dl e,	de dl ə,		
8.		wa dl e,	de dl e,	de dl ə,		
9.		*dow* ba,	dow *bwa.*	di.		
10.		de	wi________	*bi,* bə	wi *bow,*	*we* bow,
11.				we *be,*	*wə* bə,	
12.			wi be,	wə		
13.	[1:26]. . .*yuw* (*diy*)		bap.			
14.	*šə*	duw *bwiy,*	bwiy,________	diy dl *iy*		
15.		duw________	bap.			
16.	šə	duw bwiy	(*kə*), *wiy*(ə),______	*liy*(ə),__________		*da*______,
17.	wi dl	diy,________	wiy________	di,		
18.	di	ba________	ba________	duw,		
19.	də	*heh*________	*ya.*________			
20.	da	di dl *a*	da.________			
21.	šə	di dl a	*dey.*________			
22.	šə	di dl a	dey.________			
23.	*n*	dey__________,		n də da____da__________.		
	[1:45]					

zontal line) and legato or staccato articulation. The numbers at the top of the diagram indicate the beats of the measure in which each phrase is situated, while the numbers in parentheses designate beats that lie beyond the primary measure. The lines of scat "text" do not correspond exactly to measures; clearly, some lines are longer or shorter than a measure. But their vertical alignment on the page illustrates how each line relates to the tune's $\frac{3}{4}$ meter. The timings in the left margin are from the recording and indicate the start of each blues chorus.

The diagram makes certain features of the timbral organization in Carter's solo readily apparent. For example, note that Carter creates phonemic patterns by repeating certain vocable phrases. Immediate repetitions of line 1, line 7, and line 21 contribute significantly to the small dimension shape of the stanzas that contain them. These repetitions also

reinforce the lines' memorability, enabling the listener to hear in line 21 traces of lines 1 and 7, specifically the /š/ as an initial consonant and the triplet figure /de dlə/, respectively.

Lines 7 and 21 are themselves each variations of the phrases that immediately preceded them. Carter generates small dimension movement in them by slightly modifying lines 6 and 20, respectively. This movement is then stabilized by the literal repetitions that follow. Here and elsewhere—as in lines 3, 4, and 5, or in lines 10, 11, and 12—Carter varies phonemic content cumulatively. Through variation she also creates an oblique parallelism in lines 13–16, with line 13 echoed in line 15 and line 14 elaborated in line 16. The interlocking of phrases here, which reinforces a corresponding melodic parallelism, effectively sustains the solo's momentum into the second blues chorus.

Perhaps the most significant way Carter continually creates small dimension movement is by introducing fresh vocables throughout the solo. These vocables are indicated in example 3 with italics. More than two thirds of the twenty-three lines in example 3 contain at least one syllable heard for the first time, and some contain as many as three or more. In such an ever-evolving sonic environment, repetitions take on a heightened significance. Later in her career, Carter's arrangements for her own ensembles were marked by a comparable sensitivity to the capacity fresh timbres have for keeping the music constantly moving and growing. She would often reserve instrumental timbres until crucial moments in a chart, and she frequently advised her sidemen to withhold certain sounds, such as the click of the sock cymbal or the middle register of the piano, and build the arrangement by introducing such sounds gradually.[21]

Despite the wide array of sounds Carter uses in her short scat solo on "Babe's Blues," there is an underlying cohesiveness to them because she has spun all of her vocables out of a limited number of phones. For example, of the twenty-four consonants in the English language, just nine occur in the solo as initial consonants. Consistent with other singers in the scat tradition, she uses predominantly /b/ and /d/, with each of them occurring in nine vocable classes. Taken together, these two consonants initiate more than half of the vocable classes used in the solo. The consonants, /š/, /l/, /k/, and /n/, and the semi-consonants /y/, /h/, and /w/, occur as initial consonants with significantly less frequency, lending them a greater capacity for generating movement in the small dimension. Combining this limited set of initial consonants with an assortment of vowels makes for a surprising variety of vocables, although even here Carter narrows her options somewhat. Of the sixteen possible vowels at her disposal, including four diphthongs, she avails herself of only ten, six of them short (/i/, /e/, /ə/, /eh/, /u/, /a/), and four long (/ey/, /iy/, /uw/, and /ow/).

It is not unusual for a scat singer to construct a stylistic vocabulary from a limited set of phonemes. As her personal style developed, Carter became increasingly aware of the stylistic implications of specific timbral choices. Later in her career, for example, she made a point of expanding her phonemic vocabulary to include more idiosyncratic sounds, such as /l/ as an initial consonant (Bauer 2002:315–18). Further timbral and phonemic analysis of scat solos by Carter and others will reveal how specific to this performance is the vocabulary Carter uses in her solo on "Babe's Blues."

Only one consonant, /p/, occurs in the solo in the final position—appropriately enough in the vocable /bap/—the scat syllable from which the term "bop" derives (Owens 1994:137). Consistent with bebop phrasing, Carter's use of this vocable produces a clipped phrase ending in lines 1 and 2, in line 5 when the harmony moves to the IV^7 chord, and later in lines 13 and 15. While these instances of /bap/ serve as a style marker, Carter gives them large-dimension significance in the solo as well. By combining /bap/ with references to the long /uw/ vowel in the vocables /šuw/, /buw/, /yuw/, and /duw/, and by confining nearly all of these vocables' occurrences to the first four measures of each blues chorus, Carter uses timbre to reinforce the large dimension shape created by repetitions of the blues form. In the solo's last eight measures, at lines 16, 18, and 20–23, Carter returns to the same vowel /a/, both alone and with the initial consonants /b/ and /d/, gradually inducing closure in the solo's final phrases. In lines 16, 20, and especially 23, when /da/ occurs on long notes at phrase endings, the vowel—minus the truncating /p/ that ends the earlier /bap/—has an open quality less typical of bebop's clipped phrasing. This reinforces the idea that at this point in her artistic development Carter was not limiting herself to that idiom's vocabulary, but rather was incorporating the more lyrical gestures of later bop idioms.

There are other ways in which the scat vocabulary Carter has devised for "Babe's Blues" gives the solo's timbral language a distinctive sound and provides cohesiveness. Of the thirty-five different vocable classes used in the solo, the following ten are used only once: /buw/, /i/, /bwa/, /bi/, /yuw/, /kə/, /liy/, /heh/, /ya/, and /n/, causing them to sound especially fresh.[22] Such freshness enables Carter to draw attention to three crucial downbeats, in lines 5, 13, and 19, which mark the arrival points of the phrases that precede them. The rhyme between line 5 (/buw/bap/) and line 13 (/yuw/(/diy/)/bap/) reinforces a large-dimension connection between these arrival points.

In addition to introducing two new vocables in line 19, Carter incorporates a vocal ornament into the phrase /də/heh/ya/, increasing its novelty. Similarly, the fresh syllables /kə/ and /liy/ in line 16—the elaboration of line 14 pointed out earlier—amplify the impact of the passage's vocal ornaments and intentionally unmeasured plasticity, or purposeful

disruption of the vocal line's coordination with the rhythm section. Each of the vocables on the three downbeats discussed above, as well as those occuring in line 9 (/bwa/, which incorporates a smear) and in line 23 (/n/) come at the moment when Carter interrupts a repeating sequence of vocable phrases, helping her to redirect the music's movement out of the cycles these sequences create.

Certain vowels occur only in particular passages in the solo, giving each stretch its own characteristic tone color. The short vowel /e/ occurs only in lines 6–8 and 10–12, relating these two passages by timbre. Carter's insertion of vocables with the long vowel /ow/ in lines 9–10, the only passage in which this vowel sound occurs, initially creates a timbral contrast with the predominantly brighter vowels heard immediately before. Moving through lines 9–11, the alliteration caused by the initial consonants /w/ and /b/ helps to accomplish a transitional return to the brighter vowels in lines 10–12. The short vowels that predominate in lines 6–8 and in lines 10–12 also relate to the relatively shorter rhythmic values in these passages, enabling Carter to generate rhythmic momentum that she then releases in the long vowels and relatively longer rhythmic values in lines 9 and 13, respectively. In this way, she uses vowel length to reinforce the agogic rhythm of each phrase. First hinted at on a ghost note in line 13, the long /iy/ sound has been reserved to cast its brightness over the climactic passage in lines 14–17.

Carter introduces the vocable /da/ at the end of line 16, when the move to the IV chord, the defining harmonic gesture of the blues, occurs. As mentioned earlier, this vocable will gain significance as a closing sonority in lines 20 and 23. In lines 21–23, the contrasting long vowel /ey/ lends brightness to the vocable /dey/, even as the syllable's alliteration with /da/ helps lend consistency to the solo's closing lines.

As a rule, Carter chose to reject certain sounds associated with various scat singers: the /oy/ diphthong that Fitzgerald used at times, for example, or multiple repetitions of the phoneme /uw/, which Dizzy Gillespie used—typically with a glottal stop.[23] But certain sounds in Carter's arsenal may be attributed to the influence of other singers. Her use of /n/ and /d/ in the solo's closing line, for example, may have been inspired by Ella Fitzgerald, who also used these consonants in alternation.[24] Similarly, her use of the palatal-fricative /š/ (sh) reveals her debt to Sarah Vaughan, who popularized its use (Stewart 1987:67–68). At this stage in her career, Carter was still under the older singer's spell, but by the mid-1960s, she would distance herself from Vaughan's influence with regard to her choice of vocables.[25] Berliner (1994:254, 804) has described how he overheard Carter give advice to a young scat singer backstage after a concert at Northwestern University in December 1978: "Why are you using scat sylla-

bles like 'shoo-bee-doo-bee'? Those belong to Sarah [Vaughan], and they belong to the fifties. What you have to do is find your own syllables." Speaking to Leonard Lyons a few months later, Carter elaborated on this: "I do everything I can, when I scat, to not, say, start a phrase as most scat singers do with shababadoo or shababadoo-wa or -wee. A lot of scat singers start a phrase off with that sh sound" (Carter 1979). Nevertheless, although in "Babe's Blues" /š/ is clearly a borrowed sound, the way Carter uses it later in the solo—in line 14 shortly after the second chorus begins and in line 21 to recall the solo's opening in her closing phrases—contributes to the solo's large-dimension shape, giving the sound a formal function as well.

As mentioned earlier, each line of vocables in example 3 is vertically aligned with the meter, with secondary metric positions indicated in parentheses. For example, line 1 begins on the second beat of the solo's first measure and extends to the first beat of the following measure. The alignment clarifies Carter's technique of establishing a cyclic regularity by having successive passages each begin on the same beat of the measure, as occurs in lines 1–3 and lines 7–9 (as well as at other times). In using meter to generate rhythmic shape, such passages of cyclical regularity are essential foils for the contrasting passages that follow in lines 3–5 and 10–12, respectively. These disruptions are accomplished by shortening the lines' duration to two beats, a hemiola effect that makes each successive line come a beat sooner than expected. By returning to the vocable /wi/ in the latter passage (lines 10–13), Carter makes it refer back to the earlier one (lines 3–5), again using timbre to reinforce large-dimension connections. Similarly, a variant of the vocable phrase /wi/dl/i/ heard in line 6 occurs in line 17, /wi/dl/diy/, displaced by one beat. Each of these passages mark the beginning of the tune's characteristic harmonic gesture: a chromatic descent of ♯11 chords beginning in measure 6 of the 12-bar form. Preceded by the climax in lines 14–17, the cyclical regularity established in lines 18–23 helps to stabilize the rhythm. Coupled with the timbral factors mentioned above, this stabilization helps to bring about closure.

Turning to example 4, it becomes clear that many of the patterns Carter created with vocables correspond to repetitions, sequences, and variations created by pitch and rhythm. For example, Carter strengthens the shaping force of the opening melodic gesture, which echoes the closing pitches of the trumpet's set up, by repeating not only its pitch and rhythm, but also its vocables. The descending melodic sequence in measures 3–4 is similarly reinforced by the phonetic similarity of each figure, as is the sequence in measures 6–8. Both sequences gain a subtle increase in momentum from the phonetic modifications Carter introduces into each repetition. The vocables in measures 11–12 help give definition to the

Example 4: "Babe's Blues," Betty Carter scat solo (1958). Transcribed by William R. Bauer.

Medium tempo jazz waltz (♩ = 126–132)

F7
Šuw bu duw bap. Šuw bu duw bap. wi di də,

4 B♭7(♯11) B♭9 E♭7(♯11)
wi di bə, wi bə, buw bap. duw də wi dl i, di dl e, de dl ə,

7 D7(♯11) D♭7(♯11) Gm7
wa dl e, de dl e, de dl ə, wa dl e, de dl e, de dl ə, dow ba, do bwa. di.

10 C7 F C
də wi bi, bə wi bow, we bow, we bow, wə bə, wi be, wə

13 F7 B♭7 F7
yuw diy bap šə, duw bwiy, bwiy, diy dl iy duw bap šə,

hang back

16 B7(♯11) B♭7 E♭7(♯11)
duw bwiy kə wiy ə liy ə da wi dl diy, wiy di, di

19 D7(#11) D♭7(♯11) Gm7
ba ba duw, də heh ya da di dl a da. šə

22 C7 F C F
di dl a dey. šə di dl a dey. n dey, n də da da.

pairs of descending pitches. They do nothing, however, to mark the contour rhythm articulated by the four-note descending pattern that creates the hemiola effect in lines 10–12, referred to above. Carter gives each modified restatement of the descending major third figure in measure 18 fresh vocables, which helps to sustain the momentum generated by the climax that has just come before. The return of the /š/ sound in the closing measures of the solo highlights the references that these measures make to the pitches and rhythm of the opening idea.

Within the framework established by this short scat solo, pitch is also a factor in creating large-dimension growth, especially in its capacity to create contour rhythms. In this regard, the solo follows an outline similar to that of other early scat solos Carter took on such tunes as "Jay Bird" (1948), "Thou Swell" (1955), and "You're Driving Me Crazy" (1958). In those solos as well, an initial burst of energy releases itself in a drop to Carter's low register at the solo's midpoint, allowing her to build to a strong finish (Bauer 2002:247–48, 251–54). In "Babe's Blues," this archetypal contour takes a less extreme form, perhaps due to the moderate tempo and the $\frac{3}{4}$ meter, which was still relatively unusual for jazz at that time.

Several ways in which Carter interacts with the band's arrangement suggest that she may have prepared certain elements of her solo before recording it. For example, in the opening measures and at the corresponding passage in the second chorus, Carter's rhythmic patterns interlock neatly with the rhythmic patterns that pianist Wynton Kelly plays. Carter's arpeggiated augmented chords in measures 6–8 are reinforced by the pianist's voicings of the chromatically descending sequence of ♯11 chords. The singer's rhythms are reinforced as well by several of Specs Wright's snare drum hits, especially those in the first chorus turnaround at measures 11–12. Despite Carter's reputation for improvising, she herself has suggested that she took fewer risks at this time in her career, and being in the studio environment made her more cautious than when she performed before an audience.

Regardless of the degree to which Betty Carter devised this solo on the spur of the moment, the above analysis makes it clear that throughout the solo she used timbre in a variety of ways to give her scatting structure and flow. We have observed, for example, how, by introducing fresh vocables throughout the solo, she generated small-dimension movement; how, by reserving certain vowels for specific passages, she gave each passage its own distinctive sound; how, by limiting the number of phonemes she used in forging the solo's timbral vocabulary, she gave the solo its own particular character, as well as its underlying cohesiveness.

Furthermore, while the patterns and contrasts Carter created with vocables become more audible when we consider the timbral element in isolation (ex. 3), they are ultimately inseparable from the musical designs she created with rhythm, pitch, and dynamics. Example 4 clarifies how several of her timbral choices correspond to repetitions, sequences, and variations created with other musical elements. In the small dimension, for example, vowel length often serves to amplify the agogic rhythm of a passage, and to provide a vehicle for phrasing and articulating the line in the post-bebop idiom. As in Louis Armstrong's scat solo on "Heebie Jeebies," the freshness or return of certain syllables draws attention to such elements as the recurrent harmonic cycle, elements that give the solo its large-dimension shape. Several other aspects of this solo are consistent with the practice of other scat vocalists. Many singers correlate pitch with timbre, for example, using brighter vowel sounds such as /iy/ on higher pitches, and vice versa. Nevertheless, Carter's performance of "Babe's Blues" is particularly notable for the extent to which she uses timbre as a structural tool.

The work of scat singers gives us an important avenue for exploring the ways in which timbre can be used to generate musical growth, both by creating memorable shapes and by generating compelling movement. Manipulating the radiated spectrum of their sound through the continual modulation of vowels and consonants, singers control with remarkable precision the degree of timbral brightness and darkness they produce. The analytic approach presented above demonstrates that the invention of scat vocables is an essential way in which certain singers mold sound. The phonetic transcription of these vocables provides a concrete representation of timbre, a typically elusive musical element.

For many vocalists, then, timbre is much more than a vehicle for adding coloristic touches to a melodic line. But while singers' distinctive use of timbre sets their work apart from that of instrumentalists, the crossover of ideas between instrumentalists and vocalists indicates that the timbral analysis of scat vocals may offer insights that are applicable to instrumental music (Cartwright 1995). Regardless of this potential application, however, it is evident that by closely examining how singers exercise mastery over timbre as well as other musical raw materials we can increase our understanding of singers' accomplishments and deepen our appreciation of their contribution to jazz.

Notes

* Many thanks to Stephen Blum, Sigmund Levarie, Lewis Porter, Krin Gabbard, Joseph Straus, Elliott Hurwitt, Robert Abramson, Mark Burford, and Marjorie Bauer, who have all helped me refine my thinking on this subject.

1. There are jazz vocalists who do not scat but who nevertheless invite listeners to experience their renditions of songs as absolute music. The improvisational approach of such singers causes their lines to sound as if they were being played on a horn.

2. Writers often point out how jazz players vocalize on their instruments. For examples, see Jones (1963:30), Schuller (1968:127), and Porter and Ullman (1993:290), as well as Berliner (1994:109, 140, 179–81, 187).

3. Significantly, aside from a few isolated cases such as Katharine Cartwright's work (1995), those who have written on jazz singers have not built upon each other's research. This fact, as well as the paucity of jazz vocal transcriptions, is an indication of how much the study of jazz singers lags behind that of instrumentalists. Four articles that use transcriptions to illustrate what various singers do are Bennett ([1972] 1997), Stewart (1987), Bauer (1993), and Huang and Huang (1994–95). Lara Pellegrinelli's forthcoming research, which investigates how and why jazz vocalists position themselves vis-à-vis instrumental jazz, promises to shed further light on jazz singing.

4. Removing Holiday's rendition of "Strange Fruit" from the context of her entire output, Cogan erroneously assigns motivic status to her signature bending of pitch. He also ignores the fact that electronic amplification frees Holiday to apply the singer's formant selectively.

5. Notice the absence of pitch in these phones' voiceless counterparts, /p/, /t/, and /k/. Consonants, especially plosives, can also introduce into the flow of speech striking changes in envelope shape (Taylor 1980:555, 557).

6. Defined by the relationship between the amplification, frequency, and overtone structure of any sound, a relationship that produces that sound's characteristic timbre, a formant is determined by the partial or group of partials that are relatively sonorous due to the sound-producing device's distinctive resonant qualities.

7. Jazz singers, by definition, also improvise—to varying degrees—while singing words. Phonetic analyses of singers' renditions of standards can therefore help us understand how timbre figures into the musical choices they make while delivering lyrics. While it is beyond the scope of this article to explore this subject, my use of the Trager-Smith phonemes, which are specific to the sounds of the English language, lays the groundwork for its future exploration.

8. A simple vocalic nucleus is what linguists call short vowels. They do this to clarify that a long vowel (complex vocalic nucleus) results from the combination of a short vowel and a semi-vowel such as /y/ or /w/.

9. Aside from a few unusual symbols, the Trager-Smith phonemes for consonants (table 3) correspond largely to the alphabet. The phoneme /h/ is used either as a semi-vowel or as a semi-consonant, so it is not combined with /c/, /s/, or /t/ to indicate the voiceless "ch," "sh," or "th" sounds. Instead, each of these fricatives is assigned its own symbol: /č/, /š/, and /Θ/, respectively, maintaining a strict sound-to-symbol correspondence. Likewise, /ð/ is used for the voiced "th" sound heard in the word "the."

10. This solo is usually misidentified as the first scat recording. Schuller (1989:166, n. 8) has observed that Don Redman's recording of "My Papa Doesn't

Two-Time, No Time" predates "Heebie Jeebies" by over a year. The error's resilience no doubt owes to the popular success of Armstrong's recording.

11. Beginning his *Guidelines for Style Analysis* by stating, "Music is essentially movement," Jan LaRue underscores the profound significance change has in certain kinds of music, including jazz (LaRue 1970:1). His method gives us an alternative to the many approaches that focus on form, which tend to analyze musical works synchronically, as though they had already elapsed. To reinforce this point, he replaces the term "form" with "shape": "At the same time that a piece moves forward, it creates a shape in our memories to which its later movement inevitably relates" (ibid.). I have adopted LaRue's use of the term "dimension," speaking of the music's small-dimension shape, for example, when discussing immediately preceding events.

12. The formal parallelism created by these factors offers internal evidence that Armstrong may have been prepared to scat at this point in the performance, notwithstanding the fanciful story of scat's origin. This story, which alleges that Armstrong started scatting because he dropped the lyric sheet, seems designed more to underscore the solo's spontaneity than to report events accurately.

13. In his Library of Congress interview with John Lomax, Ferdinand "Jelly Roll" Morton challenged Armstrong's supposed invention of scat.

14. One can gain a sense of just how great was Armstrong's influence in this regard by comparing Ethel Waters's (December 22, 1932), Billie Holiday's (November 19, 1936), and Ella Fitzgerald's (June 4, 1957) renditions of "I Can't Give You Anything But Love, Baby" with Armstrong's version (March 5, 1929). (For a transcription of the latter, see Feather 1994:1126.)

15. Some singers gave their scatting varying degrees of forethought before performing (Stewart 1987:71), making it difficult to gauge how much of the solo was improvised.

16. Recordings that reflect some of the changes scat underwent include Calloway's "The Scat Song" (February 29, 1932), Watson's "Ja-Da" and "It's the Tune that Counts" (August 22, 1939), and Gaillard's "Hit that Jive Jack" (April 22, 1946).

17. Listen, for instance, to Vaughan's "Shulie A Bop" (April 2, 1954).

18. Many thanks to Lewis Porter for drawing these recordings to my attention.

19. One can hear echoes of Betty Carter, Dizzy Gillespie, Slim Gaillard, and Louis Armstrong in the imaginative use these younger singers make of scat singing, with Jarreau incorporating percussion sounds and Hebraic cantillation and McFerrin imitating the babbling of a newborn child. Listen, for example, to Jarreau's "Take Five" (January/February 1977) and McFerrin's "Donna Lee" (March 19, 1984).

20. Liston arranged the tune for Weston's recording of the song in October of the same year.

21. This was a recurrent theme in several interviews I conducted with Betty Carter's sidemen (see Bauer 2002:100, 114–15). Several of Carter's arrangements, including those on the album *Inside Betty Carter* (1964), also illustrate such strategic deployment of instrumental timbres.

22. While Bob Stoloff's development of technical exercises for scat singers (1996) is helpful in some respects, the approach he offers lacks the timbral variety that Carter and other singers display, indicating that budding scat singers need to supplement their technical studies with an intensive examination of established singers' recordings in order to develop a rich phonetic palette. Refreshing in this regard is Denis DiBlasio's approach to teaching scat singing (1996).

23. The notion that certain scat vocables belonged to certain people recalls the association of particular instrumental timbres with specific musicians, such as the way a stemless Harmon mute on a trumpet can evoke the sound of Miles Davis.

24. For example, Fitzgerald sings /n/ and /d/ in alternation when coming out of the bridge of "Flyin' Home" in her Jazz at the Philharmonic performance on September 18, 1949. Carter used this alternation in other scat performances, including the closing measures of her solo on "Jay Bird" (1948).

25. Carter was always vehemently opposed to the moniker "Betty Bebop" that Lionel Hampton had given her when she was touring with his band, but I believe her fiercest efforts to shake the name were during the mid-1960s.

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