Exploring the 12-key approach:

Perceptions and experiences of improvising jazz vocalists

In an interview, jazz musician Michael Cogswell (in Pellegrinelli, 2005) recounted his teacher's advice in the "best saxophone lesson" he ever had:

> Take these tunes you are working on and practice them slow, medium and fast in all twelve keys…That's the way Bird did and I did it and if you want to do it that's the way you got to do it too. (pp. 215–216)

The advice gives an illustration of how the 12-key approach has been handed down as a practice strategy for jazz musicians. The method involves learning a song, scale, arpeggio or motif in one key, then transposing and practising it in the other 11 keys. The strategy is credited with equipping instrumentalists for the jazz profession (Berliner, 1994, p. 82). The value of the method for vocalists, however, seems less clear, particularly given that changing key does not necessitate the alterations in fingering that players encounter. Lapin (in Greennagel, 1997, p. 40) summarised vocalists' experience by saying, "If they can do it in one [key], they can do it in twelve."

This article explores the educational question of whether improvising jazz vocal students should participate in similar exercises across 12 keys. Specifically, it addresses the following research question: What are improvising jazz vocalists' perceptions and experiences of using the 12-key approach as distinguished from instrumentalists'? The enquiry will begin by positioning the question in the context of relevant research and professional practice literature.

Literature review

The 12-key approach is a common practice strategy for improvisers across musical genres (Berkowitz, 2010, p. 42). For jazz musicians, the strategy is esteemed as a stepping stone to mastery (e.g., Coker, 1987, p. 16; Pressing, 1998, p. 53). Berliner (1994, p. 82) describes how young musicians undertake the "arduous course" of learning songs in all 12 keys. Their progress is scrutinised on stage where musicians "commonly test one another's skills by performing pieces 'through all the keys', modulating by descending half steps or by ascending fourths with each chorus" (Berliner, 1994, p. 82). It appears that the 12-key approach is in effect one possible rite of passage to the bandstand for the jazz musician. The prevalence of the approach is further evidenced by the number of jazz tuition books incorporating the method across decades (e.g., Aebersold, 1967; Coker, Casale, Campbell & Greene, 1970; Rawlins, 2001; Reeves, 2001; Weiskopf, 2000).

Practising motifs, songs, scales and arpeggios in 12 keys is linked with fostering facility in motor programming (e.g., Miller, 2004, p. 5; Weiskopf, 2000, p. 5). The varied tonalities necessitate mastering sequences of finger, hand, arm or lip movements to reproduce intended ideas. Proficiency in all keys is also credited with allowing improvisers to move easily through modulations. As Matteson (1980, p. 98) puts it, being able to "switch keys without hesitation" seems relevant to a genre of music that often shifts its tonal centre every few bars (Arnn, 2004).

Another argument in literature for instrumentalists to master playing in all keys is in order to accompany vocalists. Instrumentalists commonly perform jazz standards in specific keys (Sher, 1988); however, singers may request a key more suited to their vocal range. Hence there are frequent recommendations in literature for

instrumentalists to become adept at playing tunes in all keys to accommodate vocalists' needs (e.g., Aebersold in Botana & Correa, 1993; Arnn, 2004; Berliner, 1994, p. 82).

Each of the preceding citations justifies recommending that instrumentalists undertake 12-key practice. There may, however, be other gains from the strategy that are identified in research but not yet proclaimed widely in education. One in particular is the contribution of automated skills to idea generation during improvisation. Johnson-Laird's (1987, 1991, 2002) writings make a case for the necessity of automated skills in improvising due to the activity's high cognitive demand. He argues that, because of the limitations of working memory in the brain, it is not possible for performers to consciously process every aspect of every idea they use in improvising. Consequently automation is a significant asset to the improviser. It assists in meeting the constant demand for composition during real-time performance.

Automated skills used in improvisation are developed through repetition (Berkowitz, 2010, p. 42). Berkowitz (2010) explains how repetitious practice using transposition builds the improviser's knowledge of material "that can be reproduced instantaneously and automatically" (p. 45). Research suggests that automation internalises two resources useful for improvising: the ideas bank and procedural knowledge. The ideas bank, as described by Berliner (1994, pp. 95–119), is a collection of musical fragments, such as motifs, solos, licks and patterns, that have been absorbed by the improviser. They are stored initially in short-term memory, then stored in the long-term memory through repetition (Berkowitz, 2010, p. 42). These musical fragments may emerge unconsciously during improvisation as ideas used in composition (e.g., Stoloff in Wadsworth-Walker, 2005, p. 118). Coker, Casale, Campbell and Greene, (1970, p. i) suggest that the repetitive practice of the musical patterns in their book will assist musicians to pre-hear them and master "finger habits" for improvisation.

Hargreaves (2012) describes the processes as producing audiation-generated and motor-generated ideas. The ideas may be reproduced unconsciously or consciously in their entirety, partially or with modification. An example of the use of the ideas bank is observed at an elementary level in Whitcomb (2003), and at an advanced level in Gross (2011).

The repetition that builds the ideas bank also contributes to building the musician's procedural knowledge (Johnson-Laird, 2002). Procedural knowledge refers to knowledge of how to perform a task. It is absorbed unconsciously and abstracted at a higher level of thinking. Rather than retaining knowledge of a note sequence in absolute pitch, procedural knowledge extracts formulas, rules and overarching principles about manoeuvring through the musical referents of a composition. Berkowitz (2010) illustrates how repetition in multiple keys can produce knowledge of abstract relationships:

> While transposing formulas to all keys obviously provides the necessary familiarity with such patterns in each key, a broader pedagogic purpose is also served. Through rote rehearsal of any formula in all keys, the student can internalize the fundamental tonal relationships underlying the formula. That is, the memorization of parallel instances of the same underlying chord progression can instantiate a more abstract representation of the progression in a key-neutral fashion (i.e., I-IV-V-I rather than specific instances e.g., C major–F major–G major–C major in the key of C major). (p. 41)

Berliner (1994, p. 116) makes a similar observation about the contribution of the 12-key approach in acquiring procedural knowledge: "Through the rigors of transposition exercises, artists develop intimate knowledge of the characteristics of their vocabulary...its harmonic complexion."

Jazz education and research literature offer frequent examples of jazz musicians drawing on their ideas bank and procedural knowledge when improvising (e.g., Baker, 1989; Campbell, 2009, 121–122; Coker, 1964; Crook, 1999; Gioia, 2012; Gross, 2011; Murphy, 2009, p. 176–177; Norgaard, 2008, 2011; Parsonage, Frost Fadnes & Taylor, 2007). The salient point for this discussion is that the ideas bank and procedural knowledge are tools in jazz improvisation, and that they can be acquired by musicians through repetitive practice. The 12-key approach is a natural facilitator of this acquisition. In all, it is possible that the exercise that is recommended for mastering the fingering motor programme of each key makes other helpful contributions to improvisers.

The references presented so far pertain largely to instrumentalists' experiences of the 12-key approach. Discussion of the method for improvising vocalists is noticeably sparse and contradictory. For example, jazz voice educator Larry Lapin comments that vocalists do not need to learn the blues in 12 keys (in Greennagel, 1997, p. 40) while Michele Weir suggests the opposite (2003, p. 55). Perhaps the contradiction arises from a lack of clarity of what assets the 12-key approach develops. Consider Berkowitz's (2010) statement:

> One may see a cadence formula in a treatise and remember it just long enough to produce it at the keyboard, but only through repeated rehearsal in all keys can the underlying schema become embedded in long-term memory so as to be produced automatically in whatever tonal context the improviser finds himself or herself. (p. 43)

The two conditions Berkowitz gives for embedding schemata in the long-term memory are that it is rehearsed repeatedly and that it occurs in all keys so that automation can be achieved in "whatever tonal context." What is not established here

is what portion of acquired schema is attributable to repetition alone and what portion arises from repetition with transposition. It seems likely that Berkowitz is integrating the instrumentalist's motor programming needs for mastering motor schemata in 12 tonalities with the acquisition and performance of formulas. But how is this scenario applied to vocalists when the same individual motor programming need for 12 tonalities may not exist?

Berkowitz (2010, p. 46) states that "Learning a formula in various keys can foster a stronger representation of the formula's components and internal relationships." This implies that movement to various keys may facilitate abstracting formulas. It prompts the question, can the acquisition of procedural knowledge be independent of a perceived "tonal context" with its associated motor programming need for application? The answers to these questions may affect judgements of the relevance of the 12-key approach to vocalists.

What becomes evident from the literature review is that there is insufficient understanding of the vocalist's experience of the 12-key approach to effectively argue for or against its relevance. Contrasting vocalists' experience with the instrumentalists' generates insights into a hallowed jazz tradition and clarifies the place of the 12-key approach in jazz vocal improvisation education. It is into this context that the new research is positioned.

Method

Data provided in this article are extracted from a mixed methods study [name removed for peer review]. It investigated how Australian, adult improvising jazz vocalists differ from their instrumental counterparts in performing experiences and in music education. Ethics approval for the project was received from [name removed for peer review] [reference number removed for peer review]. The research took place in two stages.

Phase one was an anonymous, online survey of Australian jazz vocalists and instrumentalists. It used predominantly quantitative, closed questions. Jazz musicians were invited via letters to jazz organisations, emails, community websites, radio announcements, flyers and newsletters to participate in the study. Two hundred and nine responses were received. Chi-square analysis was performed using the software *PASW*. Results obtained in phase one assisted in the construction of the research instrument for phase two.

The second phase of the study consisted of semi-structured interviews with senior jazz educators in Australian tertiary institutions, and with skilled Australian jazz vocal performers who were nominated frequently by the initial survey participants as vocal improvisers. Twenty-two candidates consented to be interviewed. The interviews were audio-recorded and transcribed, using, with the participants' consent, first names as an identifier. The software *NVivo* assisted in organising data for thematic analysis by the researcher. The results from both phases of the study that are relevant to this article are presented here. Discussion is used to bind quantitative and qualitative findings and extract meaning.

Results and discussion

The survey measured the perceived relevance of learning a song in 12 keys to jazz musicians' professional skills. Participants (n = 209) were asked, "Is it helpful to your work as a jazz instrumentalist/singer to learn the same song in all twelve keys?" Two hundred and two responses were received (vocalists, n = 63; instrumentalists, n = 139). The majority of instrumentalists (60.43%, n = 84) regarded learning a song in 12 keys as helpful to their work. It was not considered helpful by 34.53% of instrumental respondents (n = 48), and 5.04% (n = 7) indicated "don't know." By comparison, 17.5%, of vocalists (n = 11) considered it helpful to their work to learn a song in 12 keys, while the majority of singers (76.2%, n = 48) did not. "Don't know" was selected by 6.3% of vocalists (n = 4) (see Figure 1).

Chi-square analysis shows a statistically significant relationship between whether the survey respondents were instrumentalists or vocalists and whether they considered it helpful to their work as jazz musicians to learn a song in 12 keys (χ^2 (2) = 35.111, p<.001). The result reveals a difference in perceptions. Predominantly, vocalists regarded it as less helpful than instrumentalists.

The interviews provided an opportunity to explore the nature of the perceptions revealed in the survey. Interviewees were asked to comment on their perceptions, observations and experiences of the 12-key practice strategy as jazz musicians. Generally, interviewees concurred with the findings of the survey that the 12-key approach to learning songs is considered helpful to instrumentalists' work but not to vocalists'. Discussion progressed beyond the learning of songs to that of any musical content practised in 12 keys. Mark described the method as "standard practice" for instrumentalists. Bruce, as head of a jazz department in a tertiary institution, regarded it as an expectation of instrumental students that was "more vital" for them than for singers.

Motor programming demands were cited commonly as the justification for instrumentalists to practise in multiple keys. Melissa observed that instrumentalists' need to master "different coordinations" and "different fingerings." Andrew described the trumpeter's need for "getting your fingers over those different keys."

Naomi noted that, while instruments have "different finger patterns," vocalists "don't have different larynx patterns." As Andrew pointed out, without fingering patterns, changing key "is more of just an aural thing" for singers. Ingrid agreed that "once you've got a pattern and you really know it, you usually can sing it in all those key centres." Nick described the experience of performing in different tonalities for singers:

> If you were to practice *All of Me* in one key as a singer it's not going to be any harder for me to sing *All of Me* in D-flat than it is to sing it in C. So really there's not all that much point I supposed in going through all the keys. (Nick)

Similarly, Jamie noted that, "Playing in B is way more difficult on piano than it is to play in C, whereas for vocalists doing that, it's not really that much of a change." Without the same motor programming needs to coordinate finger movement, practising in 12 keys was described as "pointless" for singers by Melissa and as having "not all that much point" by Nick.

Overall, the difference between the motor programming needs of singers and instrumentalists appeared to be central to discussions about the method.

The interviewees who did see 12-key practice as beneficial for singers generally cited gains that were not directly linked to the act of improvising. Andrew, Sharny, Naomi and Jacki each regarded it as important for vocalists to understand the theory of different key signatures, but did not consider it necessary to sing passages in all keys. Sharny's comment typified their reaction: "Go and write your song out in 12 keys, yes, but don't bother singing it in 12 keys." Likewise, Louise gave a similar perspective:

> We've had this discussion at staff meetings about whether blues in 12 keys is actually a viable and constructive thing for vocal students to be doing and I know that the vocal teachers feel that it isn't. If we're going to do an exercise with the blues for the vocalists it should be something else. It should be writing a chorus of solo or working with riffs or doing something else that they will actually use... (Louise)

Ingrid regarded 12-key practice as an opportunity to improve her vocal technique. She described using the activity as a way of "working my voice and using my muscles and balancing my registers on that set of vowels or shapes so therefore it becomes another way of getting everything to work together." Mark and Jacki considered it beneficial to practice in multiple keys to guard against intonation problems produced by always performing a song in the same key. Although Jacki did not generally regard practising in all 12 keys as useful, she did encourage practising in more than one key. Mark explained a negative effect of practising only in one key:

> Pianos can be out of tune...You might think "oh no, I always sing this in B flat'" and the piano's in A, and if you're so strong that you've done always in that key and you can't change, you're a semitone out and it's just going to be terrible. You're going to be going "what's wrong with the piano player?" and the piano player's going to be going "what's wrong with you?" (Mark)

Regardless of whether or not interviewees considered the 12-key approach helpful to vocalists, vocal range was cited frequently as an obstacle to the task. Sharny explained how such exercises "take [singers] way out of their register" and consequently, "they wouldn't be able to sing half of it." Similarly it was regarded as a likely impediment by Mark, Nick, Melissa, Naomi, Sally, Kristin, Irene, Louise, Jacki and Jamie.

Irene considered the fragility of the organic vocal instrument as obstructing the method:

> What we know about voice, and this is from the science, is that it is folly to take a voice as an instrument, because it's flesh and blood, it's muscle, and make it stretch. Taking [vocal students] too far out of range is problematic because this is a muscular instrument… It's not useful to make them sing over multiple octaves like it is with an instrumentalist because they get into all sorts of tension issues and they start to sing notes that are not completely key centred. It works against them instead of working for them. (Irene)

Issues of physical limitations of the vocal instrument were repeatedly raised as interfering with the method. Jacki, Melissa, Jamie and Naomi each pointed out that vocalists cannot practice for as long each day as instrumentalists. Sustained repetitive activities, such as 12-key practice, was described as risking damage to the vocal apparatus. The method was rejected by some on the grounds of jeopardising vocal health.

Only two of the interviewees noted that the 12-key approach may assist singers in aurally internalising a storehouse of ideas or procedural knowledge. Mark recognised the complexity of the issue in the context that difficulties with vocal range may interfere with gains:

> You've got limitations because of your range immediately... You may inadvertently ruin a tune, especially something that leaps around like *All the Things You Are* because of your limited range, but still if you're doing it in all 12 keys you are getting to understand the progression, you're getting to know the form. (Mark)

Dan Q made the same connection as Mark while discussing how musicians can incorporate a "Charlie Parker lick" into their storehouse. He elaborated that repetition can "ingrain" the sound of a flat 9 in a singer's mind. While considering the gain of the 12-key approach for instrumentalists, he made this link to singers:

> Instrumentalists should be learning all their songs in 12 keys. Why? It's not just so that they know what the notes are. It's also knowing what the pitches sound like. So many books say you've got to learn your tunes in 12 keys... What I've got out of doing that is more to do with pitch and hearing than what it has got to do with actually learning notes. That's exactly why [vocalists] should learn it. (Dan Q)

Dan Q's concept of "knowing what the pitches sound like" appears particularly pertinent to singers as their mechanisms for affecting pitch are not visible physically. Being able to "hear" the sound in the mind before singing it (i.e., audiation) is, according to Sundberg (1987, p. 58), part of the vocal process of phonating intended notes. In the interviews, Louise noted that vocalists "can't physically make [their] voice go to the right notes" unless they can audiate them first. Consequently, the link between inputting musical passages into the storehouse of ideas and procedures and having them re-emerge as audiation-generated ideas is significant to vocal improvisation, as Hargreaves (2012) explains. Thus, as Dan Q suggested, repetitive practice that ingrains the "sound" of specific ideas and procedures appears to be a feasible argument for why vocalists "should learn it."

To summarise the discussion so far, the factors dictating the appropriateness of the 12-key approach for jazz vocalists are more complex than generally presumed. Superficially there was a perception that the method is not helpful to singers because they apparently do not encounter the same motor programming challenges as

instrumentalists. The method was also rejected because it was seen as generating difficulties with range and could strain an organic "instrument." Those who did regard the method as valuable generally cited gains that did not relate directly to the act of improvising, such as learning music theory, developing singing technique and guarding against intonation problems. Two of the interviewees did identify likely benefits of the method for improvising. They saw the exercise as being able to aurally input into an ideas bank or cultivate procedural knowledge. Overall, the study echoed the perceptions noted in the literature that the 12-key approach is commonly valued for instrumental improvisation students yet regarded with uncertainty for vocal students.

Implications

The primary implication of these findings is that the possible gains of the 12-key approach in aurally cultivating an ideas bank and procedural knowledge must be investigated. Without this research, the relevance to improvising singers may not be determined accurately. Educators may be dismissing the method for singers prematurely and discouraging access to an effective tool. A greater understanding of the cognitive contribution to improvising musicians may alter attitudes to the perceived appropriateness to jazz vocal improvisation education.

Future studies have many pertinent questions to consider: Is there a positive effect on improvising by students who use the 12-key approach compared to those who do not? If so, does this effect vary if the student is an instrumentalist or a vocalist? What portion of a positive effect, if any, is attributable to repetition of exercises and what portion arises from repetition with transposition? Is the mastering of one motor programme of relative motions sufficient for vocalists to import the formula to any key?

How much benefit, if any, is acquired through the action of performing an exercise and how much is acquired through repetitive listening alone? Without the complications of learning new motor programmes for each key, can repetitive listening serve as a method of input into the ideas bank and procedural knowledge for singers?

Further research is necessary to understand the contribution, if any, the 12-key approach makes to developing skilled improvisers. This understanding is particularly fitting for the improvisation classroom that combines both instrumental and vocal students, a common occurrence in jazz education in the current financial climate (Hargreaves, 2014). Teachers can then make an informed choice about whether or not improvising vocalists would benefit from participating in repetitive, transposing exercises along with instrumentalists, or if they should invest their time elsewhere.

If research shows that the 12-key approach is beneficial to singers, then the other obstacles to the method raised during the interviews will need to be addressed. Perhaps one solution to difficulties with vocal range would be to reduce the transposition from 12 keys to four to six adjacent keys. This would give singers the experience of transposition without venturing out of a comfortable vocal range. (Male singers may prefer to continue transposing through 12 keys if they wish to develop their falsetto range.) The solution would depend, however, on first determining whether the number of keys affects the cognitive gains for singers. It may also be worth considering if other gains of changing key may be sufficiently beneficial to singers to recommend the practice. These gains may include mastering vocal function in different laryngeal positions; the advantage of achieving repetitious practice while making it appear less monotonous by frequently altering the tonal centre; and, giving singers the experience of exploring different timbres in their range rather than locking them too soon into one key for a particular song.

Another reported difficulty with the method was the inability to sustain repetitive action with a fragile, organic "instrument." During a general discussion about repetitive practice, Melissa suggested that when vocalists physically tire of an exercise, they can change from singing to playing it on an instrument, so they can continue to hear the sound. If this suggestion is applied to 12-key practice, vocalists may be able to continue inputting by hearing the sound alone. Again, this modification relies on research establishing if the act of hearing a motif is capable of inputting ideas or procedural knowledge into a singers' long-term memory and, if so, to what extent.

Conclusions

Determining the place of the 12-key practice strategy in jazz vocal improvisation education is more complex than it first appears. While the method is likely to remain important to instrumentalists for its motor programming benefits, it does not have the same assured place in the vocalist's practice regime. Future research may determine if the cognitive gains are substantial enough to recommend the practice to *all* musicians. What has been lacking until now is the justification to investigate the method further, and the understanding of where to look.

The 12-key approach is a popularly accepted jazz tradition that is capable of occupying considerable time in both lessons and private practice. It would therefore seem prudent to examine this method more closely. Investigation needs to take place before any further conclusion is reached on whether the 12-key approach is relevant to singers. If the approach is found to be sufficiently beneficial to improvising vocalists, then the next step will be to change the perception that it is, as one interviewee said, "pointless."

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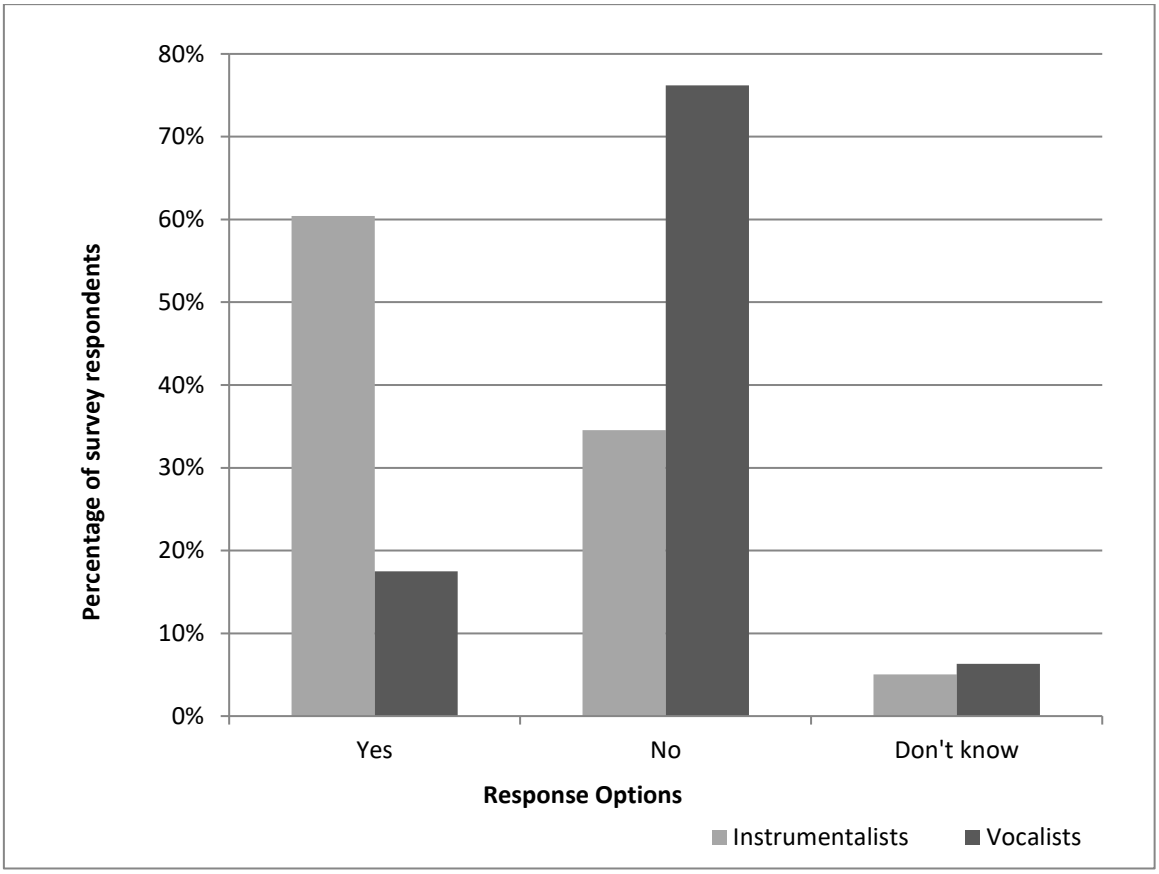

Figure 1. Musicians' perceptions of whether learning a song in all 12 keys is helpful to their work as jazz musicians.