

Lynn Holding, Associate Editor

Improve Your Students' Learning by Improving Your Feedback

Lynn Maxfield



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IT IS IN OUR NATURE AS TEACHERS to want to provide our students with every morsel of hard-earned insight, advice, and direction that we have gleaned throughout our teaching and performing careers. Our students, too, expect that information to be freely and frequently dispensed. These are not unrealistic expectations of the student-teacher relationship; after all, we have much to offer and our students are eagerly sacrificing time and (usually) money to learn. However, in our haste to direct our students' progress, we may be missing the fact that the manner in which our information is shared with our students affects the success of that endeavor as much as does the accuracy of the information itself.

Much has been written in this column regarding advances in understanding in the fields of motor learning theory and cognitive science, and how that understanding might influence the way that we teach in our studios.¹ Perhaps none of these findings are more directly applicable to our studio teaching than those regarding what information we provide and how that information is packaged and delivered to our students. In fact, Richard Schmidt notes that "most writers agree that such information is the single most important variable (except, of course, for practice itself) for motor learning."² In motor learning terms, this information is referred to as *feedback*, and there are many questions that we should ask ourselves regarding the feedback we provide. Answering questions such as what counts as feedback, what purpose it serves, when to provide feedback, and how much and what information to include in feedback, can positively affect the results of our teaching.

WHAT COUNTS AS FEEDBACK?

In its broadest motor learning sense, feedback refers to any information received by the learner before, during, and after an attempt to perform a task.³ Using this definition, students receive a substantial amount of feedback with every attempt, some of which is not related to the task being attempted. While information that is not task-related (which may or may not be a distraction) does have interesting effects on the locus of attention in learners, we will focus only on task-related feedback.⁴ The feedback that is related to the task can be further subdivided several times according to its source and its content. Figure 1 provides a flowchart of those divisions.⁵

Task-related feedback can be divided into that which is available to the student before the attempt, and that which is available during or after the attempt.

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Figure 1. Divisions of feedback.

Even though information that is presented before the attempt is crucial for her/his planning and initiation of the task, our purpose is to discuss the feedback that is provided by the instructor in response to the student's attempt. Consequently, we will focus on feedback available during (*concurrent feedback*) and after the attempt (*immediate and delayed feedback*). Feedback available during and after the attempt can be divided into feedback that is received from either intrinsic or extrinsic sources, termed *inherent* and *augmented* feedback, respectively.⁶

Inherent feedback consists of sensory information that arises as a natural consequence of attempting to perform a task, and can be further divided into categories of either *proprioceptive* or *exteroceptive* feedback. Proprioceptive feedback is that sensory information received from sources within the learner's own body (primary sources being sensory receptors imbedded within the body tissues), while exteroceptive feedback refers to sensory information received from sources outside the body, the primary sources of which are vision and hearing.⁷

Augmented feedback consists of information, other than sensory, provided to the learner from any source outside of the learner's own body, such as a mechanical device or an instructor. The instruction that we provide to our students would generally fall under the category of augmented feedback. In order for it to be most beneficial, augmented feedback should provide information that the learner cannot receive on his/her own, without the aid of the outside information source, and should supplement the inherent feedback that the learner has already received.⁸

Augmented feedback can provide information regarding the learner's performance in one of two ways. First, it can provide information regarding the result of the performance attempt, such as how close the attempt was to the target behavior. This type of feedback has been referred to as Knowledge of Results (KR).⁹ Alternatively, extrinsic feedback can provide the learner with information regarding the quality of his/her performance attempt, such as whether the attempt was made in the most efficient or effective means possible. This type of

feedback is what Antoinette Gentile termed Knowledge of Performance (KP).¹⁰

WHAT DOES AUGMENTED FEEDBACK DO?

Augmented feedback serves several purposes in the learning process. Depending on its source and content, it can serve to motivate a learner, reinforce a behavior, inform the learner, and/or produce a dependency on the feedback.¹¹ The first of these properties, motivating a learner, may not be the primary objective for the instructor when providing feedback. However, the motivational properties of that feedback often provide an added benefit to learners by encouraging them to continue to give their best effort, even when faced with repetitions and monotonous training sessions.¹²

Reinforcing feedback will, as its name implies, reinforce a certain behavior in one of two ways. First, positively reinforcing feedback will provide the learner with an experience, which due to its pleasant nature, will increase the likelihood that the desired behavior will be repeated.¹³ The second possibility, negatively reinforcing feedback, will provide the learner with an experience consisting of the removal of an unpleasant stimulus, thereby increasing the likelihood that the desired behavior will be repeated.¹⁴ To clarify, imagine a lesson with a young singer named Ben. If Ben performs a certain difficult passage correctly for the first time, the instructor might say, "That was it. Good job!" This would be an example of positively reinforcing feedback. Alternately, after previous five wrong attempts the instructor might shout, with increasing impatience, "No! That is not correct. Do it again!" Then, if the instructor said no more, but allowed Ben to continue to the next phrase, this would be an example of negatively reinforcing feedback, as the unpleasant experience of being berated by the instructor would at last be removed. In his 1978 study, Jack Adams found that positively reinforcing feedback is more effective than negatively reinforcing feedback. In the same study, Adams also found that both positively and negatively reinforcing feedback were more effective motivators than was the use of outright punishment.¹⁵

The third purpose of feedback is perhaps the most obvious, that is, to provide information to the learner. Indeed feedback is, by its very definition, information.

However, in this sense, we may adopt Schmidt's more pointed definition of informative feedback as feedback that provides learners with the "direction they need to correct their errors and to modify their future performance."¹⁶ This definition will be discussed more fully in a later discussion of what and how much information to provide during feedback.

Finally, instructors should be wary of providing feedback in such a manner that the learner becomes dependent on that feedback in order to produce the desired behavior. A study by John Annett found that learners who practiced with a physical guidance aid could not perform the task once the guidance aid was taken away.¹⁷ This was a result of the fact that the learners had become dependent on the guidance aid to help them produce the desired motion. While much of the feedback that we are providing in our studios is not in the form of physical guidance (with some exceptions), Schmidt maintains that learners can develop the same dependency on verbal feedback when it is provided too frequently.¹⁸ If this theory is valid, the logical question is, when should feedback be provided?

WHEN TO PROVIDE FEEDBACK

The question of when to provide feedback actually consists of at least three questions: 1) Should feedback be provided at all? 2) If it is determined that feedback is necessary, how frequently should it be provided? and, 3) How quickly after completing the task should feedback be given? When deciding whether or not to provide feedback, the first consideration should be whether or not feedback is necessary. While this consideration may seem intuitive, instructors frequently provide feedback almost as an instinctual response to the completion of a learner's attempt. Rather than providing this type of reactionary feedback, the instructor would be better off to consider the complexity of the task weighed against the ability and experience of the learner.¹⁹

The question of how frequently to provide feedback requires a distinction between *absolute feedback frequency* and *relative feedback frequency*. Absolute feedback frequency is simply a statement of how many times feedback was provided during a training or instruction session. Alternatively, relative feedback frequency refers to the number of times feedback was provided relative

to the total number of attempts made during the session.²⁰ For example, if in a lesson, our fictitious student Ben attempted to sing a phrase fifteen times and the instructor provided feedback five times, then the absolute feedback frequency for the session would be five and the relative feedback frequency would be thirty-three per cent. Schmidt claims that increasing absolute feedback frequency will result in increased learning and cites several studies to support that claim. However, he also states that decreasing the relative feedback frequency will also result in increased learning. If both of these assertions are true, then the ideal situation for learning would be large numbers of attempts made by the learner, with feedback being provided by the instructor only after every few attempts.

Finally, feedback timing has been shown to have a significant impact on the acquisition and retention of new motor skills, such as those being trained in the voice studio. When our students are attempting a new task, we have the option of providing feedback to them during their attempt (concurrent feedback), directly following the attempt (immediate terminal feedback), or a few seconds after the attempt (delayed terminal feedback). Verdolini and Lee have discussed concurrent feedback, citing several studies to draw the conclusion that, while concurrent feedback may provide for immediate improvements in performance ability during skill-acquisition, concurrent feedback is less effective when relatively long-term changes in performance ability are desired (i.e., learning).²¹ Recall that performance shifts are observable immediately and are usually rather fleeting, while learning can only be inferred by observing relatively long-term, stable shifts in performance ability.²² The reason that concurrent feedback is not as desirable for fostering learning is that that type of feedback provides too much guidance to the learner and will likely produce a dependency on that guidance. Once this type of feedback is removed, as in a performance setting or even a practice room, the student is unable to produce the task

The same studies cited above also found that immediate terminal feedback, while more beneficial than concurrent feedback, was less effective than delayed terminal feedback. Specifically, delaying feedback until approximately three seconds following completion of the task seems to be most beneficial to a student's

ability to retain new motor skills.²³ Assuming that the student is cognitively attentive to the learning process, offering a few seconds between the attempt and the feedback allows for the student to hone his or her own error detection skills, which are necessary for successful completion of the task in a performance environment where augmented feedback is not available.

Another very interesting possible arrangement for feedback timing is the idea of a student (learner)-directed feedback schedule. In this scenario, students would be asked to attempt a new task and be provided with feedback (either KR or KP) only when they asked for it. A 1997 experiment compared the retention of a ball-throwing skill among groups who received no feedback, summary feedback after every fifth trial, or feedback only when requested by the learner. The results of this study indicated that, while the student-directed feedback group performed similarly to those in the summary feedback group during skill-acquisition (i.e., during the lesson), the student-directed feedback group retained significantly more of their performance ability when performing the same task four days later.²⁴ Many factors may be influencing student learning in this situation, such as motivation and cognitive effort. While more research is necessary on this type of feedback schedule, it does appear that students who direct their own learning process may require less feedback to acquire a new skill and retain more of that skill than "those who are given more feedback but receive it passively."²⁵

HOW MUCH AND WHAT INFORMATION TO PROVIDE

Since memory capabilities of humans are limited, instructors must give careful consideration to how much information should be provided to the learner during each instance of feedback. Schmidt recommends focusing on one feature of the task that is most fundamental to its successful completion such as breathing or articulation, but not both.²⁶ He also suggests a method of feedback called *summary feedback*, which is again directly related to the question of frequency of feedback. In summary feedback, the instructor would withhold feedback for a number of attempts, and then provide the feedback in a summary form. In support of summary feedback, Schmidt points to studies conducted

by J.J. Lavery²⁷ and by Schmidt, Lange, and Young.²⁸ In both studies, it was found that subjects who received summary feedback performed better on a retention test of a practiced task than those subjects who received immediate feedback following each attempt. However, Schmidt also notes that as the complexity of the task being learned increases, the number of attempts being summarized should decrease in order to maximize learning.²⁹ A variation of summary feedback is to average all of the attempts being summarized to reveal a single trend that can then be addressed by feedback. This practice is known as “averaging feedback.”³⁰

When deciding what information to provide, it is of primary importance to the instructor to ensure that the information he or she is providing is addressing elements of the task that are under the learner’s control.³¹ In order to ensure that an element being addressed by an instructor’s feedback is indeed under the control of the learner, it is helpful for the instructor to have at least some understanding of how people control their movements. In the realm of singing, this stands as a convincing argument for the need for teachers of singing to have at least a rudimentary understanding of the anatomy and physiology of the singing apparatus.

It may also be beneficial for the instructor to consider whether the feedback provided is descriptive or prescriptive. Descriptive feedback simply restates the result of the attempt, whereas prescriptive feedback provides information that will be more helpful in guiding the learner’s subsequent attempts.³² To clarify, if Ben, the imagined student, sang a word with a hard, glottal onset and his instructor simply said, “The onset of that word was too glottal,” that would be descriptive feedback. If, however, the instructor told Ben how to produce a more balanced onset and avoid the glottal attack, he or she would be providing prescriptive feedback. This division may bring to mind the distinction between KR and KP; indeed, the difference between these two sets of feedback types is nuanced. To simplify, descriptive feedback may either be KR (“you ran out of breath before the end of the phrase”) or KP (“you allowed your ribcage to collapse, so you ran out of breath”). In either case, the instructor is describing what happened in the attempt. Prescriptive feedback, such as “imagine exhaling while maintaining the posture as though you are inhaling,” is an extension of KP.

A final consideration is how precise to be with feedback. It may seem that this consideration is the same as deciding what information to provide. However, there is a distinction, which can be clarified by returning once again to the example of Ben. When Ben sings a flat note, his instructor has two questions he or she must decide to pose. First, will he or she tell Ben that he was flat? This would be an example of what information to provide. Second, will he or she tell Ben just how far flat he was? This is an example of how precise to be. Schmidt notes that, in general, very precise feedback is not necessarily more effective than less precise feedback.³³ Furthermore, Magill and Wood found that learners at an early stage will not benefit from highly precise feedback because the magnitude of their errors is so great.³⁴ Instead, it may be more beneficial to provide information pertaining only to the direction (sharp or flat) and magnitude (quarter-tone) of the error. Even then, information regarding the direction of the error is more important than information regarding the magnitude.³⁵ One method of feedback that deals with the matter of precision is the bandwidth feedback method. In this practice, the instructor would withhold feedback unless the attempt falls outside the realm of some acceptable result. This practice is especially well suited to tasks in which there is a very clearly defined desired outcome.³⁶

BIOFEEDBACK

As technology is creeping ever more persistently into every corner of our lives, so too is its progression into the singing voice studio as a means of providing more accurate and precise feedback to budding singers. Feedback from technological means has come to be known as *biofeedback*, and it certainly provides a promising source of valuable information, although with a few caveats. Benefits of some sources of biofeedback include their ability to provide objective measures of vocal characteristics that were previously only subjectively observed (e.g., timbre, legato, onset, pronunciation), as well as their ability to convert aural feedback to a visual display, which may be helpful to some learners.

While these benefits can be significant, they must be considered within the context of the previous discussion of feedback in general. First, the temptation may be to provide a real-time display of biofeedback during

a singer's attempt at a task. Recall, however, that concurrent feedback may not be the most beneficial to long-term skill retention (i.e., learning). It may be more beneficial instead for the instructor to view the real-time feedback and highlight segments to which he or she can draw the student's attention a few seconds after the completion of the attempt.

Second, teachers are always seeking for the most accurate information that they can provide to their students, and sources of biofeedback may indeed provide very accurate and precise information regarding a particular performance attempt. However, keep in mind that biofeedback is generally descriptive in nature, and not prescriptive. In order for that descriptive feedback to be beneficial to the student, he or she must also know what to do to correct the error being described in the feedback. Also, keep in mind that pinpoint precision may draw a student's awareness to a focus that is too internal, which can be detrimental to learning.³⁷

BEST PRACTICES

With so many variables to be considered in regard to feedback in your voice studio, it may be helpful to weigh your current feedback habits against the following best practices.

1. Feedback is helpful only if it is necessary. If the task being attempted is simple, or if the feedback you would provide is redundant for the singer, it may not be necessary to say anything at all. Even if at first it results in awkward silent moments, do not overload students with unnecessary information.
2. Less frequent feedback is more effective. Encourage students to try a task two, three, or even four times before providing feedback about their performance. Again, it may result in a few uncomfortable moments at first as you and your student get used to saying/hearing less, but reducing the relative frequency with which feedback is provided will encourage students to develop their own hypotheses about their performance and to test those hypotheses in subsequent attempts.
3. Wait a few seconds before providing feedback. Students attempting new motor skills need a moment to recall the sensations of the attempt they just made and to weigh it against the expected outcome for that attempt. Providing that time in your teaching will

encourage students to develop an ability to critically evaluate their performances and make self-diagnosed adjustments.

4. Consider whether your feedback is descriptive or prescriptive. By simple definition, neither is better than the other, but each has its own pitfalls. If providing too much descriptive feedback, it could be that you are in danger of giving information that is redundant, and therefore less useful. If overly prescriptive, feedback can induce an internal locus of attention that can also inhibit learning.
5. Encourage students to assess their own performance and request feedback when they need it. It appears that learner-controlled feedback scheduling could positively impact learning in a couple of ways. First, it encourages a reduced feedback frequency environment, which has already been shown to improve learning.³⁸ Second, it requires that learners be more attentive to the task of learning a new skill in order to determine when they require feedback and when they do not. This focused attention is absolutely essential to the process of learning.³⁹
6. Use biofeedback when possible, but keep it in perspective. Never shy away from new ideas or teaching strategies. Also, don't throw away what you already know in favor of something new, just for newness' sake. Biofeedback can be quite beneficial, but it is still feedback and its use should receive as much consideration as any other type of feedback, especially in regard to timing and content.

Collectively, teachers of singing have an enormous amount of information and experience to share with students. Few moments are as exciting as seeing a student who has grappled with a new task suddenly experience a breakthrough as a result of some tidbit of guidance you have provided. However, by giving as much attention to the manner in which we present information as we do to the content of that information, we can improve the long-term sustainability of those "Aha" moments and facilitate the learning that students need in order to stand on their own as performers.

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Lynn Maxfield, PhD, is a Voice Teacher and Research Associate at the National Center for Voice and Speech. He holds a PhD in Voice Pedagogy and an MA in Voice Performance, both from the University of Iowa. Prior to joining the NCVS, he taught voice and voice pedagogy at Eastern Connecticut State University and Knox College, as well as music theory and ear training at Carl Sandburg College. In addition to teaching and researching, he maintains an active performance presence. His opera credits include Tamino and Monastotos in Mozart's *Die Zauberflöte*, Sam Polk in Floyd's *Susannah*, Orpheus in Offenbach's *Orpheus in the Underworld*, and Guglielmo in Donizetti's *Viva la Mamma*. A proponent of new music, Maxfield recently appeared in an Eastern-Iowa tour of Eric Chasalow's 2007 opera, *The Puzzlemaster*, and participated in the premier of several new orchestrations of the 26 Italian Songs and Arias by Galesburg, IL composer Daniel Godsil. In 2011 he joined the chorus at the Lyric Opera of Chicago in their production of Wagner's *Lohengrin* and now joins the Utah Opera Chorus for the 2012–2013 season.

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