

Effects of the Focus of Attention on Learning.

But if we hold to the figurative use of the word (focus), we are able to grasp something valuable to singers, a sensation, illusory perhaps, that when the tone is well produced it “comes to a point,” either in front of the mouth, at the teeth, or even as high as the bridge of the nose... This quality of “point” or “focus” is the prime essential of good tone.

William Vennard, “Singing: The Mechanism and the Technic”. 1967, Carl Fischer. p150

In humans, just as in animals and birds, it turns out that each hemisphere attends to the world in a different way—and the ways are consistent. The right hemisphere underlies breadth and flexibility of attention, where the left hemisphere brings to bear focussed attention. This has the related consequence that the right hemisphere sees things whole, and in their context, where the left hemisphere sees things abstracted from context, and broken into parts, from which it then reconstructs a “whole”: something very different. And it also turns out that the capacities that help us, as humans, form bonds with others—empathy, emotional understanding, and so on— which involve a quite different type of attention paid to the world, are largely right-hemisphere functions.

Iain McGilchrist “The Master and his Emissary” Yale University Press 2009

In “real life” the mother begging for her child’s life, the criminal begging for a pardon, the atoning lover pleading for one last chance—these people give no attention whatever to their own state, and all attention to the state of the person from whom they require their object. This outward-directedness brings the actor in “real-life” to a state of magnificent responsiveness and makes his progress thrilling to watch

David Mamet “True and False” Faber and Faber 1998 p13

Summary:

- Techno-physical approaches to singing focus on the physical coordinations involved.
- Physical coordinations that serve an intention are also called motor skills.
- Techno-physical approaches and language require an internal focus on the part of the singer.
- The relative success of internal and external foci in developing motor skills has been extensively studied
- An external focus is, broadly speaking, considered to be more congenial to learning and performance.
- This could be remembered when following a techno-physical approach or using techno-physical language in singing teaching.

Physical descriptions of singing.

There are many ways one can view the act of singing: an intensive act of communication, a feat of great musicianship, an impressive display of resonance and volume. A techno-physical approach sees singing as a physical act, and seeks to improve it through improving the physical coordinations and energisations involved. There may be disagreements about what the best coordinations are, but the approach is, by definition, united in its focus on the physical basis of the human voice.

Motor Skills.

Skills involving the movement and coordination of the human body, serving particular intentions, are known by researchers as motor skills. A significant amount of research has considered how best these skills are acquired, developed and refined. An important aspect of the research considers what effects different kinds of *focus* have on the rate and retention of learning.

A learner can adopt one of two types of focus: internal or external. If they turn their attention *inward*, onto their own body or its movement, they are adopting an *internal* focus of attention. Conversely, if they focus *away* from their body, on the effects, imagined or real, of their action, they have an *external* focus.

The distinction is in fact more subtle: internal foci are considered those where the performer seeks to improve their coordination directly, by self-manipulation. Before the act is begun, the intention is to coordinate the body in a particular way. This differs from maintaining bodily awareness during performance, when the focus, before and during, can be still external. An internal focus has as its explicit aim a particular movement or coordination of the body.

A reasonable approach.

Techno-physical approaches to teaching singing necessitate an internal focus. Techno-physical language offers information *about* the body of the singer *to* the singer. It encourages direct manipulation *of* the body, through conscious control.

The approach does seem reasonable. The teacher is aware, through the appearance and sound of the singer, that physical usage could be improved. They also know exactly *how* the coordinations involved should be adjusted. They offer this information to the student, and ask them to act on it. The idea is that the singer then manipulates their physicality to advantage, by means of direct control. They practise this new coordination until its effects are well-known and habituated. They can then continue their singing with a healthier, more resonant, and expressive voice.

Sometimes this does seem to be how things work, but sometimes it doesn't. What could account for this?

Internal or External: which is more effective?

Research into the relative efficacy of internal and external foci in motor learning has been undertaken for many years now. Here are some of the specific findings:

Accuracy in shooting basketball hoops increased when attention was paid to the rim of the basket, rather than the movement of the wrists: (Zachry, Wulf, Mercer, & Bezodis, 2005)

Accuracy in shooting basketball hoops increased after watching a video of an expert and focussing on a broad "how" they did it, rather than attempting to replicate the expert's movement: {Al Abood 2002}

Novice darts throwers were trained using instructions that required either an internal or an external focus. After two sessions, those trained using external focus instructions were significantly better. Even if a thrower *preferred* the internal focus instructions, they performed worse if they used them, rather than the external: (Marchant, Clough, Cranshaw, & Levy, 2009)

Experienced footballers trained to hit an elevated target were more effective when using an external focus (no mention of any body part in the instruction). In addition, one week later, unguided, they were still better than those trained using internally focussed instructions (guide your foot in this way...): (Wulf 2007)

Whilst most of the existing research has focussed on sports, music and ballet have also been investigated. Piano skills have been looked at, with pianists learning a brief passage under conditions of external and internal focus:

Our results support Wulf et al.'s (2001) constrained action hypothesis. It seems that in this limited example of a music performance skill, participants performed more effectively when they were able to recruit automatized components of long-practiced motor behavior by focusing on the effects that their movements produced, rather than focusing on the movements themselves. (Duke, Cash, & Allen, 2011)

In ballet, the effects of the precise wording of instructions have been looked at, with consideration given to whether external or internal foci are used. A survey suggests internal foci are widely used by professional dancers, despite the potential advantages of external foci: (Guss-West & Wulf, 2016)

Finally, the effects of focus in improving speech have been investigated:

...the findings highlight the intriguing possibility that attentional focus may be an important variable to consider in treatment of speech disorders. If an internal focus impedes oral-motor performance, as it did in the current study, then efforts to learn and improve oral movements or speech may be hampered by opposing effects of an internal attentional focus if such a focus is adopted during treatment. (Freedman, Maas, Caligiuri, Wulf, & Robin, 2007)

Summary of the current position.

Here is Gabrielle Wulf in a review of ten years' of research in 2007:

Studies examining the influence of an individual's focus of attention on motor performance and learning are reviewed. Those studies, conducted over the past decade or so, provide converging evidence that an external focus of attention (i.e., focus on the movement effect) is more effective than an internal focus (i.e., focus on the movements themselves). (Wulf 2007)

Here she is in 2017:

Since the publication of the first study demonstrating the advantages of an external focus for motor learning, many studies have followed. In that original paper, learning was found to be enhanced when participants were instructed to focus on the pressure exerted on the wheels of a ski simulator (external focus) or the markers attached to a balance platform as opposed to their feet (internal focus). In fact, in these and subsequent studies, a one- or two-word difference

in the instructions ('your hand' versus 'the club') had differential effects on learning— despite similar informational content. Instructions that direct attention away from one's body or self and to the intended movement effect have consistently been found to have a beneficial effect on motor performance and learning. (Lewthwaite & Wulf, 2017)

The issue is not, of course, without debate. There are suggestions that different stages of learning might require different foci. Also there is disagreement over the role and relationship between focus and awareness. Papers discussing that include:

(Gray 2004): this suggests that breaking out of a performance slump may require a technical breakdown of the issues, necessitating a temporary internal focus. A short-term reduction in performance might be compensated for by long-term improvements.

(Beilock, Carr, MacMahon, & Starkes, 2002): this paper broadly supports the use of an external focus, but suggests that absolute beginners might benefit from a step-by-step guide to technique.

More recently, some authors have questioned the role of body awareness and the choice of instructions issued to performers: (Toner, Montero, & Moran, 2016) and (Toner & Moran, 2016)

In this article, though, we are not seeking definitive answers, nor performing a full survey of the literature. The question before us is whether there is anything potentially disadvantageous in the use of techno-physical approaches in the teaching of singing. I think there is enough in the research literature to suggest that there *might* be, even whilst keeping an open mind.

Why might an external focus benefit the development of motor skills?

It does seem somewhat counter-intuitive, that physical self-instruction might be inferior to an outward, trusting focus. Why might this be? Wulf posits a “constrained action hypothesis”:

Advantages of adopting an external focus, induced by instructions or feedback, have been shown for a variety of motor skills, skill levels, and populations (including persons with motor impairments). Evidence in support of the constrained action hypothesis, which has been put forward as an explanation for the attentional focus effects, is presented. These findings indicate that an external focus promotes automaticity in movement control, with the consequence that the effectiveness and efficiency of motor performance is enhanced. Importantly, there is evidence to suggest that an individual's focus of attention not only influences performance temporarily, but that it affects the learning of motor skills. (Wulf 2007)

The constrained action hypothesis essentially implies that attempts to self-manipulate the body are too coarse and too lumbering. Internal focus instructions suggest a manner of operation that may not be possible. We interfere in unhelpful ways. In attempting to “do” something with our bodies, automatic, responsive coordinations can be disrupted. If we try to, say, “lift our soft palate”, perhaps other vital muscular engagements might be prevented or corrupted? We might meet with success, but we might not.

If there are pre-existing, natural, coordinations that a singer can build on, it could be advantageous not to disrupt those. This leads us later to questions on the nature of classical singing: does it build on a natural act, or is it an unnatural imposition on the body. However, for now it is enough to consider if attempts at consciously guided physical manipulation are effective.

Other experimentally verified benefits to external focus.

The use of an external focus in learning has been found to carry other benefits. The extract below summarises them; it is a pretty impressive list of results:

It has been well established that an individual's focus of attention can have important implications for motor performance (e.g., Beilock, Carr, MacMahon, & Starkes, 2002; Gray, 2004; Jackson, Ashford, & Norsworthy, 2006; Wulf, 2007). That is, what an individual focuses on during the execution of a motor task can greatly influence the quality and accuracy of the movement. To this extent, research has demonstrated that an external focus of attention (i.e., focus on the effects of the movement on the environment) can lead to greater performance accuracy (e.g., Wulf, Lauterbach, & Toole, 1999; Wulf & Su, 2007), reduced attentional/working memory demands (e.g., Wulf, McNevin, & Shea, 2001), reduced brain and muscle activity (e.g., Zachry, Wulf, Mercer, & Bezodis, 2004), reduced susceptibility to choking under pressure (e.g., Land & Tenenbaum, 2012), and overall better outcome performance (e.g., McNevin, Shea, & Wulf, 2003) compared to an internal focus (i.e., attention directed to the performer's own body movements) or irrelevant focus (i.e., attention directed to stimuli not pertaining to the task).

(Land, Frank, & Schack, 2014)

According to this list, an external focus:

- Promotes greater accuracy
- Reduces effort of attention and working memory
- Reduced muscular and brain effort
- Provided an “overall better performance outcome”
- Reduces the risk of “choking” under pressure

Thriving under pressure.

For singers aiming for the top of the profession, a high-stress, high-risk place to be, it is particularly notable that performance failure seems to be reduced when the focus is external, and self-instruction implicit rather than explicit (techno-physical instructions are also explicit in nature):

There is good evidence that a major cause of choking is self-focused attention (e.g., Baumeister, 1984; Gray, 2004). Could practising with an external focus prevent, or at least reduce, choking? (Wulf 2007)

We can envisage the training of an undergraduate singer over a four year degree course. During that time, the singer will receive hundreds of hours of individual teaching and coaching. That intensive training will, in all likelihood, structure their thinking about singing for years to come. They are being prepared for an art that involves regular, highly pressurised moments of performance. Evidence suggests that a training rich in internal focus methods will increase the possibility of “choking”, a significant reduction in performance skill, at precisely those moments.

On the other hand:

Evidence was found to support the hypothesis that the skill of performers with a small pool of explicit knowledge (knowledge of the physical workings of their motor skill-AA) is less likely to fail under pressure than that of performers with a large pool of explicit knowledge. (Masters 1992)

This might be another reason to temper the use of techno-physical instruction when teaching singing. Relying on explicit descriptions of physical knowledge, accompanied by attempts at self-directed physical manipulation, can increase the likelihood of performance failure: *a small pool of explicit knowledge is less likely to fail under pressure.*

Longer lasting learning.

Finally, in addition to the findings already discussed, it seems that learning under conditions of external focus means learning occurs more quickly...

In many instances, as the focus of attention moves farther from the body, improvements are seen earlier in the learning process (Maddox et al., 1999; McNevin et al., 2003; Totsika & Wulf, 2003; Wulf, McNevin, Shea, & Wright, 1999). (Duke et al., 2011)

And lasts for longer...

the present results were clear in showing that increasing the distance of the effect from the action producing it, through the attentional focus manipulation, enhanced learning. Furthermore, FFT analysis on retention data revealed that focusing on effects that were in close spatial proximity to the body (near), or focusing on the body itself (feet), compromised (or constrained) the regulatory processes involved... (McNevin, Shea, & Wulf, 2003)

The actual process of learning and retaining a skill seems to be enhanced by maintaining an external focus. In fact, up to a point, the further the focus from the body, the more successful the learning:

What is an external focus?

This article offers evidence from recent scientific research to suggest it could be reasonable for singing teachers to avoid an over-reliance on methods that promote the use of internal focus in their pupils.

What kind of external foci could be used? There are of course many traditional and well-known examples on which singing teachers can draw. The “placement” of the sound at a point in front of the singer (William Vennard at the top of this piece alludes to this), spin, legato line, evenness of resonance and so on. All these metaphors of sound draw the attention out of the body whilst still promoting physical change.

In addition, certain ways with text and communication can draw the focus out. The history of vocal pedagogy is rich in points of focus, many of which are external.

Conclusions.

On balance, it seems to reasonable to conclude that current research encourages the use of external focus points when teaching the development of motor skills. Teachers of singing might wish to consider this. Techno-physical approaches are defined as those that adopt an internal focus: they should perhaps be used with awareness, as internal focus points seem to be less efficacious for learning. If meta-technical, externally-focussed alternatives can be found, serving the same end, some of the pitfalls associated with internally-focussed learning could be avoided.

Alex Ashworth

August 2017

Luzern

Bibliography.

- Al-Abood, A., Bennett, S.J., Hernandez, F. M., Ashford, D., & Davids, K., (2002).Effect of verbal instructions and image size on visual search strategies in basketball free throw shooting. *Journal of Sports Sciences Vol. 20(3),2002*
- Beilock, S., Carr, T., MacMahon, C., & Starkes, J. (2002). When paying attention becomes counterproductive: Impact of divided versus skill-focused attention on novice and experienced performance of sensorimotor skills. *Journal of Experimental Psychology, 8(1)*, 6-16.
- Duke, R. A., Cash, C. D., & Allen, S. E. (2011). Focus of attention affects performance of motor skills in music. *Journal of Research in Music Education, 59(1)*, 44-55. doi:10.1177/0022429410396093
- Freedman, S. E., Maas, E., Caligiuri, M. P., Wulf, G., & Robin, D. A. (2007). Internal versus external: Oral-Motor performance as a function of attentional focus. *J Speech Lang Hear Res, 50(1)*, 131. doi: 10.1044/1092-4388(2007/011)
- Gray, R. (2004). Attending to the execution of a complex sensorimotor skill: Expertise differences, choking, and slumps. *Journal of Experimental Psychology. Applied, 10(1)*, 42-54. doi:10.1037/1076-898X.10.1.42
- Guss-West, C., & Wulf, G. (2016). Attentional focus in classical ballet. *Psychonomic Bulletin & Review, 20(1)*, 23-29. doi:10.12678/1089-313X.20.1.23
- Land, W. M., Frank, C., & Schack, T. (2014). The influence of attentional focus on the development of skill representation in a complex action. *Psychology of Sport and Exercise, 15(1)*, 30-38. doi:10.1016/j.psychsport.2013.09.006
- Lewthwaite, R., & Wulf, G. (2017). Optimizing motivation and attention for motor performance and learning. *Current Opinion in Psychology, 16*, 38-42. doi:10.1016/j.copsyc.2017.04.005
- Land, W. M., Frank, C., & Schack, T. (2014). The influence of attentional focus on the development of skill representation in a complex action. *Psychology of Sport and Exercise, 15(1)*, 30-38. doi:10.1016/j.psychsport.2013.09.006
- Mamet, D. (1998). True and False. *Faber and Faber*. p13
- Marchant, D., Clough, P., Cranshaw, M., & Levy, A. (2009). Novice motor skill performance and task experience is influenced by attentional focusing instructions and instruction preferences. *International Journal of Sport and Exercise Psychology, 7(4)*, 488-502.
- Masters, R. (1992). Knowledge, knerves and know-how: The role of explicit knowledge versus implicit

knowledge in the breakdown of a complex motor skill under pressure. *British Journal of Psychology*, 83, 343-358.

McGilchrist, I. (2009) *The Master and his Emissary*. Yale University Press.

McNevin, N. H., Shea, C. H., & Wulf, G. (2003). Increasing the distance of an external focus of attention enhances learning. *Psychological Research*, 67(1), 22-9. doi:10.1007/s00426-002-0093-6

Toner, J., & Moran, A. (2016). On the importance of critical thinking: A response to Wulf's (2015) commentary. *Psychology of Sport and Exercise*, 22, 339-340. doi:10.1016/j.psychsport.2015.05.007

Toner, J., Montero, B. G., & Moran, A. (2016). Reflective and prereflective bodily awareness in skilled action. *Psychology of Consciousness: Theory, Research, and Practice*, 3(4), 303-315. doi:10.1037/cns0000090

Vennard, W (1967) *Singing: The Mechanism and the Technic*. Carl Fischer. p150

Wulf, G. (2007). Attentional focus and motor learning: A review of 10 years of research. *Bewegung Und Training*

Zachry, T., Wulf, G., Mercer, J., & Bezodis, N. (2005). Increased movement accuracy and reduced EMG activity as the result of adopting an external focus of attention. *Brain Research Bulletin*, 67(4), 304-9. doi:10.1016/j.brainresbull.2005.06.035