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# The Mnemonist's legacy: on memory, forgetting, and ableist discourse in twenty-first-century inclusive music education

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## ABSTRACT

*Expert musical memory has been the fundamental focus of research in the field of musical memory, and this line of research has demonstrably informed the ways memory is understood by the current generation of music professionals. In this theoretical inquiry, we draw on Foucault to first argue that the dominant Western classical music expert gaze in music and memory studies can be seen as a form of ocularcentrism. Second, due to this narrow gaze, the field also fails to recognise that the human memory system is characterised by a unique symbiosis of not just learning and remembering, but also forgetting, a potentially powerful theoretical aspect of memory in music education. Third, we argue that the recent 'genetification' of musical memory, together with the narrow expert gaze, may further reinforce old dichotomies between the talented and untalented, abled and non-abled. Through a critical lens towards the politics of knowledge production in memory studies, we argue that there is a need for a more critical, holistic and ethically reflexive understanding of memory in professional education in music and music education.*

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## Introduction

The memories of highly skilled musicians – developed through endless practice and persistent repetition – offer fruitful, although not unproblematic, paradigmatic cases for cognitive scientists and neuroscientists to investigate memory functions. Although all of the world's musical traditions rely on memorising, often exclusively, a considerable portion of literature in music psychology and education deals with domain-specific 'skilled' and 'expert' memory within the Western classical music tradition (e.g. Chaffin, Imreh, and Crawford 2012) forming the dominant understanding of why memory matters in music and music education. The results of such studies are used to provide guidance on how to avoid memory lapses in memorised classical performances (e.g. Ginsborg 2004; Lehmann, Sloboda, and Woody 2007). In this narrow scholarly gaze, recognisable in the current music education professional discourse, remembering appears crucial to the process of learning, whereas forgetting is the highly negative counterpart of the activity.

However, whilst memorising as much as possible and minimising forgetting is important in music-making, it is seldom observed that too much memory can be a problem. Individuals who

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have the kind of extraordinary memory that society strives for are often overwhelmed by their special abilities and do not typically excel in other areas of life. Two well-known case studies illustrate this. Jill Price (known in the literature as ‘AJ’) (Parker, Cahill, and McGaugh 2006) and Solomon Shereshevsky (known in the literature as ‘S’) (Luria and Bruner 1987) both had exceptional memories. Price was able to recall immense autobiographical detail from any day in her life, often in an unstoppable rush of memories that she described as ‘exhausting’. Despite this exceptional memory ability, she did not excel in other areas of her life but felt that the memories were a ‘burden’ which drove her ‘crazy’ (Parker, Cahill, and McGaugh 2006, 35). Shereshevsky was able to remember vast amounts of information, and ‘details which other people would overlook, or which would remain on the periphery of awareness, took on the independent value in his mind, giving rise to images that tended to scatter meaning’ (Luria and Bruner 1987, 130). Consequently, he had to learn to intentionally forget in order to be able to function in his daily life. Although extreme, these cases remind us that remembering everything can have major drawbacks for the one who is remembering and that forgetting can be a release.

In this theoretical inquiry, we argue that the current professional discourse on musical memory which considers expert practice related to the highest capabilities and represents forgetting as a mistake to be avoided, needs to be expanded in order to adequately guide teachers’ thinking; specifically, it is particularly inadequate for guiding music teachers’ thinking in contexts where the goal is to include all students equally. We argue that in experience and experienced learning, forgetting is not simply an erasure, deletion, or disappearance, but that forgetting ‘exists within remembering like yeast in dough’ (Draaisma 2015, 4). Moreover, the recent trend of searching for the genetic bases of various skills, including musical memory, has created a need for musical memory research which takes into account the starting points of *all* learners. Together with the already narrow, historically dominating gaze on music and memory, this new stream of genetic research in music may strengthen the professional discourse where those not ‘genetically endowed’ enough to study music are excluded or not of interest in the professional world. This narrow professional discourse can be viewed against the UNESCO guide for education that stresses that all forms of exclusion and marginalisation need to be addressed, specifically those ‘inequalities related to access, participation, and learning processes and outcomes’ (UNESCO 2017, 12). The skills and attitudes of teachers regarding learners’ abilities play a role in inhibiting inclusive and equitable practices (13) and, as we argue, research foci and academic stances support to some extent the development and change of teachers’ attitudes (Kaplan and Lewis 2013). As a whole, this inquiry argues that, since epistemological foci and preunderstandings have practical consequences (see also, Odendaal, Levänen, and Westerlund 2018), the use of research results in professional education needs an ethical reflexivity that recognises the power that underpins knowledge production.

## Research objectives

By first highlighting the dominant understanding of musical memory in the literature of music psychology and education, this theoretical inquiry aims to show the need for a more holistic and critical view of musical memory, a view where music psychology can be relevant for music teaching and learning situations beyond that of Western classical instrumental music tuition that aims at professional expertise. Second, we explore some of the positive understandings of forgetting in musical memory and learning, drawing on general memory studies, in order to illustrate how memory and forgetting could be conceptually more intertwined in music learning. Looking at memory and forgetting in the context of experience and learning experience in particular, allows us to consider the everyday ‘doings and undergoings, of trials and errors’ that lead to knowledge, musical understanding, and thoughtful action – and which, taken together, contribute to the culture of education (Westerlund 2003, 16). Third, through considering recent genetic studies of musicality, we wish to remind of the power of research discourses and argue that scientific research can also have negative consequences for professional education of music and music education by reinforcing the already

established dichotomous ableist discourses through the narrow interest on highly skilled expert musicians, and by reducing musicality into a biological and genetic phenomenon.

Methodologically, we attend to a pragmatist epistemology that sees knowledge and theoretical concepts not simply as mirroring or describing reality, but rather as pragmatic tools that serve critical rationality embedded in practical action (Westerlund and Väkevä 2011). In this view, knowledge of the real world is about connections among existents and the consequences of the things in human use. We, therefore, explore existing research with a specific epistemological interest, following the principle of Dewey's inquiry in which '[t]he problem fixes the end of thought and the end controls the process of thinking' (Dewey MW, 6:190, orig. italics).

More specifically, our analysis uses Foucault's Panopticon as a metaphor to explore power in knowledge-production. The term Panopticon refers to the techniques of knowledge that, according to Foucault (1995), form an important mechanism that automatizes and disindividualises power: 'Power has its principle not so much in a person as in a certain concerted distribution of bodies, surfaces, lights, gazes; in an arrangement whose internal mechanisms produce the relation in which individuals are caught up' (231). Panopticon schema can be used on a multiplicity of individuals on whom a task or a particular form of behaviour, such as musical behaviour, is imposed. By identifying the intersection between what Foucault (1994) termed the 'episteme (the conditions of possibility of knowledge), affective attachment (the conditions of knowledge's plausibility) and phantasmatic projection (the meta-narrational, symbolic investments that drive or accrue to scientific enterprises)' (Steinberg 2016, 1), we argue, following Steinberg (2016), that knowledge of musical memory is a 'terrain of affect', a persuasion with tendencies and a science of 'discourse and spectacle, of feeling and desire' (4). Thus, the discursive formation of a field, in this case, musical memory studies, define a system of conceptual possibilities that determines the boundaries of thought in contemporary music education (Foucault 1994). The symbolic investment to privilege certain understandings of musical memory can itself be seen as a cultural phenomenon wherein a certain meta-narrative is pervasive as a result of certain, and only certain, ends controlling the process of thinking.

In the following, we present three arguments concerning memory, forgetting, and genetic research in music that illustrate the ways through which meta-narratives of scientific discourse influence professional thinking and priorities, and form the normalised dominant stream of scientific investigations against the notion of an abstract and neutral society. As such, the analysis neither aims to cover the existing studies on musical memory nor does it pose critique for its own sake. Rather, the overall aim is to suggest some alternative ways of conceiving memory in music and music education, which may inform future research and strengthen the field as a whole, as well as inform students in the field of music in a responsible manner. This is considered necessary in a time when the critical lenses concerning the elite power of researchers and professionals are only slowly emerging in the field of music education.

### **The expert gaze on musical memory**

The majority of research about musicians' memorisation has taken the perspective of expertise theory (Ericsson and Charness 1994), where memorisation of expert musicians can be characterised according to three principles (Chaffin, Imreh, and Crawford 2012, 198). First, expert musicians draw on their long histories of engaging with music when learning new works, which enables them to relate the new work to previously learned material, facilitating an efficient grouping of material (198). Second, musicians use the hierarchical structure of music in sections, phrases, and motives as a retrieval scheme when having to recall a work in performance (71 and 198). Third, retrieval using the scheme provided by the music is typically rehearsed over an extended period of time and draws on a variety of representations (Ginsborg 2004, 137), including what musicians call visual, auditory, motor, and analytic memory (Imreh and Crawford 2012). This well-rehearsed retrieval is typically much faster than that of non-expert retrieval from long-term memory.

These principles have motivated a significant number of researchers to consider the ways that advanced musicians approach learning and memory tasks in order to identify the strategies that expert memorisers use, thus leading to the identification of best practices. However, expertise in performance does not necessarily imply expertise in memorisation, as skill in memorisation is rather related to using specific strategies that aid the memorisation process (Ginsborg 2002). For example, Mishra (2002) shows that a holistic or additive approach is used by the efficient memorisers in her study and that sequential or segmented approaches are used by the inefficient memorisers. Similarly, mental rehearsal can be as effective as a physical practice, but this is a strategy that requires practice to be efficient (Highben and Palmer 2004). The strategies selected are influenced by other variables such as the demands of the musical material (Odendaal 2018) and self-efficacy (Nielsen 2004). Musicians use a range of strategies to achieve a detailed and rich memory of musical works, including: 'writing down parts of the piece, analysing it away from the instrument, starting in different places, or singing one voice while playing another (for pianists)' (Lehmann, Sloboda, and Woody 2007, 118). The interest in expert memory is evident in the populations chosen for these studies (professional or semi-professional musicians), and the applications of these findings are typically to the expert and one-on-one expert instruction process.

Importantly, a common misconception among musicians is that memorisation refers to that part of the learning process which aims at producing a memorised performance of some music (see also Lehmann, Sloboda, and Woody 2007, 118). However, the formation of memories informs every aspect of musical practice, and musical training will influence many aspects of musical experience. For instance, it has been shown that musicians are better able to extract the melodic structure in order to remember melodies than people who have not received musical training (Halpern and Bower 1982). Musicians are also better than their non-trained peers in matching tonal materials (Schulze, Jay Dowling, and Tillmann 2012) and on a rhythm span task (Schaal, Banissy, and Lange 2015). Musicians draw on a memory for timbre that may be more based on spectral than dynamic cues, and that draws on musical imagery (Crowder and Pitt 1992). All of these phenomena may draw on the strong coupling of motor experience and musical memory (Mathias, Tillmann, and Palmer 2016). The implication of these findings is that the long engagement musicians have had with music in turn informs any current engagement with music, although such influence may often be implicit rather than explicit.

The aim of research into expert memorisation may not be to influence general music education, however, it is significant that there is almost no research on memory or strategies for memorising to be used in the general music classroom (see e.g. Gromko et al. 2009), and that musical memory research has predominantly excluded musical styles other than classical music (see, however, Bakan 1993; Noice et al. 2008; Helmlinger 2006). The research drawing on expertise theory is included in well-known books on the psychology of performance, which are often used as material to instruct professional education of musicians and music educators (Lehmann, Sloboda, and Woody 2007; Parncutt and McPherson 2002; Williamon 2004). In these books, memory is almost exclusively discussed in the very specific context of remembering what to play or sing from notation, and also draws almost exclusively on the classical pianistic paradigm, where it is imperative that *everything* that is notated be remembered for a successful performance to take place. In this ocular-centric gaze, forgetting is typically understood in terms of a memory lapse – an embarrassing and debilitating catastrophe to be avoided at all costs (Mishra 2010).

### **The (missing) symbiosis of remembering and forgetting in music learning**

Musical memory involves much more than merely playing from memory what was first read from notation, and forgetting is both inevitable and even important in this very focused process of remembering how to perform. Part of the reason why forgetting has escaped the attention of researchers in music psychology and related fields might be that it is particularly difficult to study. The majority of research on forgetting in general psychology draws on paradigms where participants have to

memorise lists of numbers, nonsense syllables or matched words. Recall of these lists is tested under different conditions in order to be able to understand the ways in which forgetting functions. Yet, there is a vast difference between memorising lists of numbers, nonsense syllables or word pairings and learning to perform music. Memorising music, whether by playing or by listening, typically involves emotions, motivation, and meaning in ways that lists of nonsense syllables cannot, and when kinaesthetic memory is added it can be assumed that musical memories are much stronger and more resilient than those that can be created in experimental situations. It is therefore important to note that the applicability of the research on forgetting to musical memory and forgetting is speculative.

While no widely accepted theory of forgetting has yet been formulated (Levy, Kuhl, and Wagner 2010), Bjork and Bjork (1992) draw on their characterisation of memory according to two strengths (storage strength and retrieval strength) to explain fundamental processes of forgetting. In their model, forgetting does not simply mean that the information or procedure is missing, but rather that there is a 'decrease in accessibility [...] at a given point in time and in the presence of current cues' (Bjork 2014, 25). Such a decrease in accessibility assumes that forgetting is not all-or-nothing, but a 'graded and context-dependent phenomenon' (Nørby 2015, 552). Forgetting thus refers not to deletion, but rather to inaccessibility. Furthermore, memories are not simply kept in storage as is information in a computer, separate from and uninfluenced by other memories, but rather 'the act of retrieving information from human memory modifies the system' (Bjork and Bjork 1992, 38), thereby also possibly inducing forgetting through interference. Various processes have been suggested to cause forgetting in different situations, including: failed encoding; disrupted consolidation; the natural decay of memories over time; interference or competition in the retrieval process; ineffective retrieval cues; and defects in the reconsolidation of memories (Levy, Kuhl, and Wagner 2010; Valtorta and Benfenati 2010).

Despite the negative connotations of many of the descriptive terms in the previous list, forgetting plays an important role in daily life, including aiding emotional regulation (Nørby 2015), mental health (Nørby 2018), learning (Bjork 2014; Nørby 2015), and context attunement (Nørby 2015), as well as creativity (Storm and Patel 2014). Indeed, current research indicates that '[t]he human memory system is characterised by a unique symbiosis of learning, remembering and forgetting' (Bjork 2014, 25). The forgetting of negative declarative memories such as negative life events aids emotional regulation and mental health by enabling positivity, while forgetting negative non-declarative memories, such as negative emotions, enables painlessness (Nørby 2015). Forgetting unneeded information aids knowledge acquisition and cognition by facilitating abstraction, and forgetting unnecessary steps and operations in automation aids efficient motor operations (Nørby 2015). Learning situations that seem to produce forgetting may actually be helpful, by providing new stimuli with which to re-encode learning material and thereby strengthening the storage of the memory (Bjork 2014). The forgetting of distant and inappropriate information and the revising of outdated information helps people 'relate to, and synchronise with, their surroundings in a time-sensitive manner' (Nørby 2015, 565). Lastly, forgetting enables creativity by inhibiting old ways of thinking from impeding new ways of thinking – what is usually called mental fixation (Storm and Patel 2014).

While almost no literature exists that has investigated forgetting in musical learning, the role of forgetting has been tangentially identified in some research, and drawing on the literature reviewed above enables us to point to some areas where forgetting plays an important role in musical learning and memory. Forgetting is crucial to the most basic processes of perception. In these basic perceptual processes, attention, memorising, and remembering are closely related but distinguishable processes. Although phenomena such as perceptual binding (Honing 2011; Krumhansl 1991) are strongly influenced by biological processes, listeners also draw on implicitly learned musical models, based on the kinds of music that they listen to, in order to judge these differences (Demorest et al. 2016). Memory thus influences attention by shaping what is heard and how it is heard. For instance, 'the brain becomes less receptive to rhythms that are not listened to' (Honing 2011, 129). Forgetting,

related to not paying attention and to not encoding material for memorisation, is thus essential to the very process of perception.

Forgetting, however, not only impacts the shortest time spans of perception, but also the ways in which the memories of compositions or performances are shaped. For example, memory errors in performed music are less common at metrically strong points (Mathias et al. 2011) and places where the performer places more attention, such as the outer voices, a salient inner voice, or motivic material (Gingras et al. 2016). Furthermore, listeners remember the affective impact of a musical experience not as the sum of all the musical experiences, but through a ‘slope effect’ (Rozin, Rozin, and Goldberg 2004), again suggesting that some aspects of the experience are forgotten, or never encoded. These findings suggest that ‘less important’ details are often not encoded as strongly as more salient aspects. This finding relates well to the idea of performance cues as selected aspects of a musical composition that are used to structure the performances of complex works (Chaffin, Imreh, and Crawford 2012).

In the experienced learning process, it is understood that performers use these performance cues in order to be able to navigate their way through performing complex musical compositions (Chaffin, Imreh, and Crawford 2012). In the process of forming the final performance cues, other cue candidates are used and either discarded or overridden (Odendaal 2018). However, forgetting some cues does not mean that they are necessarily eliminated, but rather that they can be suppressed to allow one to focus on other aspects of the performed music. Ginsborg (2017) argues that these cues, together with experiences from previous performances, may still be used in future performances. The automation involved in forming performance cues depends on forgetting in the sense that the details of the automated actions are not available to conscious thought at the time of performing. Attention to every detail of movement would likely be overwhelming rather than helpful, in the same way that remembering every detail of her life was overwhelming to ‘AJ’ (Parker, Cahill, and McGaugh 2006). Moreover, it is necessary for musicians who perform regularly to be able to forget their negative stage experiences, so that fear of a repeat experience does not debilitate their performance. For instance, Schlosser (2011) makes use of regular video viewing for himself and his students to overcome excessively negative evaluations of performances and lessons, thereby enabling positivity (Nørby 2015). Perhaps equally important is that performers do not only remember positive experiences, which might lead to complacency.

Forgetting can thus be implicated as a core phenomenon in several aspects of the learning and memory processes of musicians, and is not only involved in the learning process, but most likely contributes also to the continued wellbeing and health of a practising musician. While not disparaging the research that has been conducted to this point, we want to point out the selectiveness of this research with regards to how music, memory – and indeed musical expertise – are defined. In Foucault’s terms, the ocularcentric and panoptical gaze on musical memory identifies, orders, and makes differences visible, by seeing and perceiving the phenomenon in particular ways (Foucault 1995, 231).

### **Ableist discourse and docile musical bodies**

While the panopticon that has over time constructed musical memory studies may not be a malicious attempt to silence all other perspectives, it creates a discursive system in which it becomes hard to voice a dissenting view, not because it will not be valued, but because the researcher’s gaze is narrowed by the discursive field in which she finds herself. This discursive field has recently been expanded to include genetic studies, which seem to have as their aim the identification of the ‘musical gene’. Memory studies indicate considerable inter-individual differences in musical abilities and music memory (e.g. Grahn and Schuit 2012; Odendaal 2018), and there has been a growing interest in the biological basis of such abilities in genetic studies (for reviews, see e.g. Oikkonen et al. 2016; Tan et al. 2014). The genetic basis of various aspects of musical ability involve several activity-dependent immediate early genes that respond to sensory and motor stimuli, and several

genes that are located on the candidate genomic regions for music abilities in humans (e.g. Oikkonen et al. 2016). Individual differences in the enrichment of these genes during various cognitive functions, such as musical creativity (Oikkonen et al. 2016), have been linked to memory and learning abilities (Mariath et al. 2017; Tan et al. 2014). However, there is also evidence for gene–environment interaction from twin studies (e.g. Hambrick and Tucker-Drob 2015), suggesting that genetic potentials for skilled performance are most fully expressed and fostered by practice.

The popular appeal of these kinds of studies (one need only try an internet search for the terms ‘genetics and music’) point to a move towards the ‘age of the gene’, which has impacted not only ‘the arenas of biotechnology and medicine’ but also ‘politics, popular culture, political economy and everyday vernacular’ (Steinberg 2016, 1). In research of this kind, it is essential to understand the obvious selectiveness with which the researcher is working, a selectiveness that does not necessarily allow for research findings to be generalised to other contexts, especially not if much of the world’s musical practices are excluded (see Odendaal, Levänen, and Westerlund 2018 for a critique in the field of neuroscience). In this regard, Levitin (2012) has made a strong argument for first understanding what it means for someone to be musical prior to embarking on genetic research about musicality. Despite this, a number of the genetic studies make strong assumptions about musicality and musical achievement that do not take into account Levitin’s careful argument. Ignoring the basic philosophical and theoretical work that is needed to understand musicality tends to result in ocular-centric research on expertise in Western classical music, often within a ‘performativity-oriented education’ (Kanellopoulos 2015, 323). The prevalent use of musical ability tests in this kind of research further reinforces the ableist discourse (Darrow 2015); a discourse that manifests in student selection methods that specify who is entitled to learn and perform music (Laes and Westerlund 2018). Adding a genetic imperative to such testing bodes ill for the idea that everyone should and can have access to music and music education. Research aids in painting a dystopian picture in which individuals will be rightfully included or excluded from musical education based on their genetic code, and where it is legitimate that only those with the right genetic framework receive access to music education. In contemporary society, this otherwise politically incorrect picture might be welcomed when intertwined with the dire economic prospects that many countries in general face.

We suggest that in an environment where the idea of ‘education for all’ is increasingly becoming more of a general principle than an exception (UNESCO 2017), a change is needed in how we conceptualise and research musical memory. Instead of dichotomous categorizations that locate persons in ‘a social space of difference’ (Mitchell and Snyder 1997, 4), there is an increasing need for research into how to take into account diverse abilities in an inclusive teaching space. Such inclusive and ethically oriented methodology in music teaching includes equally the ‘theory and practice of teaching and learning’ (Kaplan and Lewis 2013, 3). According to Laes (2017), the overall discursive formation of the understanding of talent tends to polarise general music education when students’ potential is estimated with a Bell-curve, in this way creating a discourse of dichotomies between the gifted and the non-gifted, talented and untalented, abled and non-abled (29). Laes has thus posed a question whether ‘music education should totally relegate itself from using the concepts relating to musical ability or talent as a natural human feature’ (30) if these concepts and their pragmatic consequences prevent us from supporting the development of the musical abilities of all students. Equally, the panoptical transformation constituted by the ‘genetic revolution’ is, in itself, a cultural phenomenon that may have wider cultural consequences (Steinberg 2016, 2). We can ask whether musical memory studies in this age of the gene will produce what Foucault (1995) called ‘docile bodies’, subjected to disciplinary power to make them more useful and controllable; bodies that can be optimised, calculated, and improved.

## Conclusion, and the possible directions of future research

Whilst seeing studies on music and memory as a promising field of research, this theoretical inquiry has examined how the gaze on musical memory studies has predominantly concentrated on expert



practice, in which forgetting appears as a major failure, and how forgetting, the missing counterpart of learning in current scholarship, is a necessary concept in understanding how memory functions in the context of learning experience. Memory and forgetting are the two symbiotic counterparts of learning, both neither necessarily positive nor negative as such, but equally important parts of a student's experience in the process of learning music. The importance of pointing this out extends beyond merely adding another facet to the understanding of expert memory; it also contributes to a critical theoretical argument about the ways in which research discourse informs and is informed by practice – how science silently forms our thinking in professional life. The working definitions of music in research will influence the kinds of questions that are asked and by extension the range of answers that will be provided (see also Odendaal, Levänen, and Westerlund 2018). The inquiry has highlighted how research objects themselves can be seen as cultural phenomena constituting the professional culture of music and music education.

We have merged studies on musical memory with those exploring the genetic basis of musical memory and musical abilities, in order to call for an ethical reflexivity that considers the consequences of scientific discourses that reduce human phenomena, such as music education, to biological phenomena. It is important to notice that the Panopticon of the expert gaze on musical memory (within Western classical music), together with the genitification of scholarship on musical abilities, when used to explain the excellence of some people, is not an accidental epistemological emphasis. Rather, as Foucault (1994) would explain, it may be seen to fall under the domain of a modernist society in which equity is subsumed under economics and the efficient division of labour, and in which human sciences are compelled to surrender to a medicalised and biological gaze. Although music psychologists may not address the same ethical imperatives as music education practitioners, it is necessary for professional education in music to identify how theories and scientific discourses may function as mechanisms of inequality in a silent systemic manner. It is also necessary for students in professional education to understand the various forms in which power operates through research and how marginalisation of people might be unintentionally constructed through professional education. Moreover, those studying musical memory from a genetic perspective need to understand the power of Panoptical discursive formation when research results are published for the wider public or used in educating future practitioners. Knowledge production shapes not only scientific expert communities but the whole of society (see Benedict and Schmidt 2011, for a similar argument in the context of school curricula). The turn towards inclusive practice, as suggested by twenty-first-century global policies and much of contemporary music education research, needs, therefore, to be understood as an ethical and political movement that also critically considers the discursive power of research.

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## References

- Bakan, Michael B. 1993. "Lessons from a World: Balinese Applied Music Instruction and the Teaching of Western 'Art' Music." *College Music Symposium* 33/34: 1–22. <https://www.jstor.org/stable/40374246>
- Benedict, C., and P. Schmidt. 2011. "Politics of Not Knowing: The Disappearing Act of an Education in Music." *Journal of Curriculum Theorizing* 27 (3). <https://journal.jctonline.org/index.php/jct/article/view/232>
- Bjork, Robert A. 2014. "Forgetting as a Friend of Learning." In *Remembering: Attributions, Processes, and Control in Human Memory*, edited by D. Stephen Lindsay, Colleen M. Kelley, Andrew P. Yonelinas, and Henry L. Roediger III, 15–28. New York: Psychology Press.
- Bjork, Robert A., and Elizabeth L. Bjork. 1992. "A New Theory of Disuse and an Old Theory of Stimulus Fluctuation." In *From Learning Theory to Connectionist Theory*, edited by William Kaye Estes, 35–67. New York: Psychology Press.
- Chaffin, Roger, Gabriela Imreh, and Mary Crawford. 2012. *Practicing Perfection: Memory and Piano Performance*. New York: Psychology Press.
- Crowder, Robert G., and Mark A. Pitt. 1992. "Research on Memory/Imagery for Musical Timbre." In *Auditory Imagery*, edited by Daniel Reisberg, 29–44. Hillsdale: Lawrence Erlbaum.
- Darrow, A. A. 2015. "Ableism and Social Justice: Rethinking Disability in Music Education." In *The Oxford Handbook of Social Justice in Music Education*, edited by Cathy Benedict, Patrick Schmidt, Gary Spruce, and Paul Woodford, 204–220. Oxford: Oxford University Press. doi:10.1093/oxfordhb/9780199356157.001.0001
- Demorest, Steven M., Steven J. Morrison, Vu Q. Nguyen, and Erin N. Bodnar. 2016. "The Influence of Contextual Cues on Cultural Bias in Music Memory." *Music Perception; Berkeley, California* 33 (5): 590–600. doi:10.1525/mp.2016.33.5.590.
- Dewey, John. 1978/2008. "The Middle Works: 1899-1924 (MW), Volume 6." In *The Collected Works of John Dewey 1882-1953*, edited by J. A. Boydston. Carbondale: Southern Illinois University Press.
- Draaisma, Douwe. 2015. *Forgetting: Myths, Perils and Compensations*. Translated by Liz Waters. New Haven, CT: Yale University Press.
- Ericsson, K. A., and N. Charness. 1994. "Expert Performance: It's Structure and Acquisition." *American Psychologist* 49: 725–747. doi:10.1037/0003-066X.49.8.725.
- Foucault, Michel. 1994. *The Order of Things: An Archaeology of the Human Sciences*. Translated by Unnamed. New York, NY: Vintage.
- Foucault, Michel. 1995. *Discipline & Punish: The Birth of the Prison*. Translated by Alan Sheridan. New York, NY: Vintage Books.

- Gingras, Bruno, Caroline Palmer, Peter N. Schubert, and Stephen McAdams. 2016. "Influence of Melodic Emphasis, Texture, Salience, and Performer Individuality on Performance Errors." *Psychology of Music* 44 (4): 847–863. doi:10.1177/0305735615594491.
- Ginsborg, Jane. 2002. "Classical Singers Learning and Memorising a New Song: An Observational Study." *Psychology of Music* 30 (1): 58–101. doi:10.1177/0305735602301007.
- Ginsborg, Jane. 2004. "Strategies for Memorizing Music." In *Musical Excellence: Strategies and Techniques to Enhance Performance*, edited by Aaron Williamon, 121–141. Oxford: Oxford University Press.
- Ginsborg, Jane. 2017. "Memory in Music Listening and Performance." In *Performing the Remembered Present: The Cognition of Memory in Dance, Theatre and Music*, edited by Pil Hansen, Bettina Bläsing, and John Lutterbie, 69–96. New York: Continuum-3PL.
- Grahn, Jessica A., and Dirk Schuit. 2012. "Individual Differences in Rhythmic Ability: Behavioral and Neuroimaging Investigations." *Psychomusicology: Music, Mind, and Brain* 22 (2): 105–121. doi:10.1037/a0031188.
- Gromko, Joyce Eastlund, Dee Hansen, Anne Halloran Tortora, Daniel Higgins, and Eric Boccia. 2009. "Effects of Temporal Sequencing and Auditory Discrimination on Children's Memory Patterns for Tones, Numbers, and Nonsense Words." *Journal of Research in Music Education* 57 (2): 140–151. Doi:10.1177/0022429409335891.
- Halpern, Andrea R., and Gordon H. Bower. 1982. "Musical Expertise and Melodic Structure in Memory for Musical Notation." *The American Journal of Psychology* 95 (1): 31. doi:10.2307/1422658.
- Hambrick, David Z., and Elliot M. Tucker-Drob. 2015. "The Genetics of Music Accomplishment: Evidence for Gene-Environment Correlation and Interaction." *Psychonomic Bulletin & Review* 22 (1): 112–120. doi:10.3758/s13423-014-0671-9.
- Helmlinger, Aurélie. 2006. "Testing the Influence of the Group for the Memorisation of Repertoire in Trinidad and Tobago Steelbands." In *9th International Conference on Music Perception and Cognition*, 1172–1175. Bologna, Italy. <https://hal.archives-ouvertes.fr/hal-00445783>.
- Highben, Z., and Caroline Palmer. 2004. "Effects of Auditory and Motor Mental Practice in Memorized Piano Performance." *Bulletin of the Council for Research in Music Education* 159: 58–67. <https://www.jstor.org/stable/40319208>.
- Honing, Henkjan. 2011. *Musical Cognition: A Science of Listening*. Piscataway, N. J: Transaction Publishers.
- Imreh, Gabriela, and Mary Crawford. 2012. "In the Words of the Masters: Artists' Account of Their Expertise." In *Practicing Perfection: Memory and Piano Performance*, edited by Roger Chaffin, Gabriela Imreh, and Mary Crawford, 26–65. New York: Psychology Press.
- Kanellopoulos, Panos. 2015. "Musical Creativity and 'the Police': Troubling Core Music Education Certainties." In *The Oxford Handbook of Social Justice in Music Education*, edited by Cathy Benedict, Patrick Schmidt, Gary Spruce, and Paul Woodford, 318–339. Oxford: Oxford University Press.
- Kaplan, Ian, and Ingrid Lewis. 2013. *Promoting Inclusive Teacher Education: Materials*. Bangkok: UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000221036>.
- Krumhansl, Carol L. 1991. "Music Psychology: Tonal Structures in Perception and Memory." *Annual Review of Psychology* 42 (1): 277–303. doi:10.1146/annurev.ps.42.020191.001425.
- Laes, Tuulikki. 2017. "The (Im)Possibility of Inclusion. Reimagining the Potentials of Democratic Inclusion in and through Activist Music Education." *Studia Musica* 72, Helsinki: Sibelius Academy of the University of the Arts.
- Laes, Tuulikki, and Heidi Westerlund. 2018. "Performing Disability in Music Teacher Education: Moving Beyond Inclusion Through Expanded Professionalism." *International Journal of Music Education* 36 (1): 34–46. doi:10.1177/0255761417703782.
- Lehmann, Andreas C., John A. Sloboda, and Robert H. Woody. 2007. *Psychology for Musicians: Understanding and Acquiring the Skills*. Oxford: Oxford University Press.
- Levitin, Daniel J. 2012. "What Does It Mean to Be Musical?" *Neuron* 73 (4): 633–637. doi:10.1016/j.neuron.2012.01.017.
- Levy, Benjamin J., Brice A. Kuhl, and Anthony D. Wagner. 2010. "The Functional Neuroimaging of Forgetting." In *Forgetting*, edited by Sergio Della Sala, 135–164. Hove and New York: Psychology Press.
- Luria, Aleksandr R., and Jerome Bruner. 1987. *The Mind of a Mnemonist: A Little Book About a Vast Memory*. Translated by Lynn Solotaroff. Cambridge, MA: Harvard University Press.
- Mariath, Luiza Monteavaro, Alexandre Mauat da Silva, Thayne Woycinck Kowalski, Gustavo Schulz Gattino, Gustavo Andrade de Araujo, Felipe Grahl Figueiredo, Alice Tagliani-Ribeiro, et al. 2017. "Music Genetics Research: Association with Musicality of a Polymorphism in the AVPR1A Gene." *Genetics and Molecular Biology* 40 (2): 421–429. doi:10.1590/1678-4685-GMB-2016-0021.
- Mathias, Brian, Caroline Palmer, Peter Q. Pfordresher, and Maxwell F. Anderson. 2011. "Effects of Meter and Serial Position on Memory Retrieval During Music Performance." In *Proceedings of the International Symposium on Performance Science 2011*, edited by Aaron Williamon, Darryl Edwards, and Lee Bartel, 405–410. Utrecht: Ass. Européenne des Conservatoires, Académies de Musique et Musikhochschulen (AEC).
- Mathias, Brian, Barbara Tillmann, and Caroline Palmer. 2016. "Sensory, Cognitive, and Sensorimotor Learning Effects in Recognition Memory for Music." *Journal of Cognitive Neuroscience* 28 (8): 1111–1126. doi:10.1162/jocn\_a\_00958.

- Mishra, Jennifer. 2002. "A Qualitative Analysis of Strategies Employed in Efficient and Inefficient Memorization." *Bulletin of the Council for Research in Music Education*, 74–86. doi:10.1037/h0094039.
- Mishra, Jennifer. 2010. "A Century of Memorization Pedagogy." *Journal of Historical Research in Music Education* 32 (1): 3–18.
- Mitchell, David T., and Sharon L. Snyder. 1997. "Introduction: Disability Studies and the Double Bind of Representation." In *The Body and Physical Difference: Discourse of Disability*, edited by David T. Mitchell, and Sharon L. Snyder, 1–33. Ann Arbor: University of Michigan Press.
- Nielsen, Siw G. 2004. "Strategies and Self-Efficacy Beliefs in Instrumental and Vocal Individual Practice: A Study of Students in Higher Music Education." *Psychology of Music* 32 (4): 418–431. doi:10.1177/0305735604046099.
- Noice, H., J. Jeffrey, T. Noice, and Roger Chaffin. 2008. "Memorization by a Jazz Musician: A Case Study." *Psychology of Music* 36: 63–79. doi:10.1177/0305735607080834.
- Nørby, Simon. 2015. "Why Forget? On the Adaptive Value of Memory Loss." *Perspectives on Psychological Science* 10 (5): 551–578. doi:10.1177/1745691615596787.
- Nørby, Simon. 2018. "Forgetting and Emotion Regulation in Mental Health, Anxiety and Depression." *Memory (Hove, England)* 26 (3): 342–363. doi:10.1080/09658211.2017.1346130.
- Odendaal, Albi. 2018. "Individual Differences Between the Practising Behaviours of Six Pianists: A Challenge to Perceptual Learning Style Theory." *Research Studies in Music Education*, doi:10.1177/1321103X18774365.
- Odendaal, Albi, Sari Levänen, and Heidi Westerlund. 2018. "Lost in Translation? Neuroscientific Research, Advocacy, and the Claimed Transfer Benefits of Musical Practice." *Music Education Research* 0 (0): 1–16. doi:10.1080/14613808.2018.1484438.
- Oikkonen, Jaana, Tuire Kuusi, Petri Peltonen, Pirre Raijas, Liisa Ukkola-Vuoti, Kai Karma, Päivi Onkamo, and Irma Järvelä. 2016. "Creative Activities in Music – A Genome-Wide Linkage Analysis." *PLoS One* 11 (2): e0148679. doi:10.1371/journal.pone.0148679.
- Parker, Elizabeth S., Larry Cahill, and James L. McGaugh. 2006. "A Case of Unusual Autobiographical Remembering." *Neurocase* 12 (1): 35–49. doi:10.1080/13554790500473680.
- Parncutt, R., and Gary E. McPherson. 2002. *The Science and Psychology of Music Performance: Creative Strategies for Teaching and Learning*. Oxford: OUP.
- Rozin, Alexander, Paul Rozin, and Emily Goldberg. 2004. "The Feeling of Music Past: How Listeners Remember Musical Affect." *Music Perception: An Interdisciplinary Journal* 22 (1): 15–39.
- Schaal, Nora K., Michael J. Banissy, and Kathrin Lange. 2015. "The Rhythm Span Task: Comparing Memory Capacity for Musical Rhythms in Musicians and Non-Musicians." *Journal of New Music Research* 44 (1): 3–10. doi:10.1080/09298215.2014.937724.
- Schlosser, Milton. 2011. "Minding the Music: Neuroscience, Video Recording, and the Pianist." *International Journal of Music Education* 29 (4): 347–358. doi:10.1177/0255761410396966.
- Schulze, Katrin, W. Jay Dowling, and Barbara Tillmann. 2012. "Working Memory for Tonal and Atonal Sequences During a Forward and a Backward Recognition Task." *Music Perception: An Interdisciplinary Journal* 29 (3): 255–267. doi:10.1525/mp.2012.29.3.255.
- Steinberg, Deborah Lynn. 2016. *Genes and the Bioimaginary: Science, Spectacle, Culture*. London: Routledge. doi:10.4324/9781315584294.
- Storm, Benjamin C., and Trisha N. Patel. 2014. "Forgetting as a Consequence and Enabler of Creative Thinking." *Journal of Experimental Psychology: Learning, Memory, and Cognition* 40 (6): 1594–1609. doi:10.1037/xlm0000006.
- Tan, Yi Ting, Gary E. McPherson, Isabelle Peretz, Samuel F. Berkovic, and Sarah J. Wilson. 2014. "The Genetic Basis of Music Ability." *Frontiers in Psychology* 5, doi:10.3389/fpsyg.2014.00658.
- UNESCO. 2017. *A Guide for Ensuring Inclusion and Equity in Education*. 37.014.53 GUI [86]. Paris: UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000248254.page=20>.
- Valtorta, Flavia, and Fabio Benfenati. 2010. "Synaptic Plasticity and the Neurobiology of Memory and Forgetting." In *Forgetting*, edited by Sergio Della Sala, 101–134. Hove and New York: Psychology Press.
- Westerlund, Heidi. 2003. "Bridging Experience, Action, and Culture in Music Education." *Studia Musica* 16, Sibelius-Akatemia. <https://helda.helsinki.fi/handle/10138/234870>.
- Westerlund, Heidi, and Lauri Väkevä. 2011. "Who Needs Theory Anyway? The Relationship Between Theory and Practice of Music Education in a Philosophical Outlook." *British Journal of Music Education* 28 (01): 37–49. doi:10.1017/S0265051710000409.
- Williamon, Aaron. 2004. *Musical Excellence: Strategies and Techniques to Enhance Performance*. Oxford: OUP.