

Classical piano playing as a pathway to flow states for learners with disabilities

Lee D. Stockner^{1*}

¹Occupational Octaves Piano.

***Correspondence:**

Lee D. Stockner. Occupational Octaves Piano, Music Lee Inclined Guy, Inc. 75 Phipps Ln, Plainview, NY 11803.
E-mail: Lee@OccupationalOctavesPiano.com

Derivation of happiness through playing classical music represents a rare pinnacle of musical experience. Biofeedback based research on playing piano in the state of effortless attention, named flow, has provided data which fortifies testimonials of pleasure during performance. Benefits include lower blood pressure, smooth breathing, a sense of disconnection from anxiety, and even feelings of euphoria. Other than in cases of extraordinary talent, it is highly uncommon for individuals with pervasive and profound disabilities to reach a flow state through music performance. One of the bedrocks of reaching a flow state is having expertise in all elements of an activity which special learners may struggle with, especially if learning to play classical music. However, with a new language of music designed with the highest possible degree of clarity and ease (hereafter referred to as the Special Language), expertise is completely within reach for almost anyone with basic color and letter matching skills. Using this method, students with severe challenges can immediately understand instructions, chain them together into melodic patterns and engage in the flow of reproducing music. With these skills unlocked, students who cannot read traditional notes can begin the step by step process of learning to play properly. This change in approach opens up potential fields of research to discover how great an impact flow states at the piano can have on individuals who cannot read traditional music notation, how music teachers can prioritize flow in music education, and how educators and therapists who do not read traditional music notation can use music in the classroom. The purpose of establishing credibility of the Special Language/Flow Approach is to enable a higher quality of life for individuals who may not have the ability to attain it for themselves.

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Introduction

“Brain imaging studies of young children with autism have shown overgrowth and dysfunction of the prefrontal cortex [1], which can be regulated during transient hypofrontality, or the temporary deactivation of the prefrontal cortex [2]. Transient hypofrontality is also the unifying feature of all altered states of consciousness [3], of which the “flow state” is one of the most desirable. Flow can be induced through many endeavors including exercise, meditation or playing music once a person can develop a closed mental loop focused purely on the experience. Being in a state of flow is marked by moments so intrinsically rewarding, people seek more challenging goals to relive the experience to a greater degree [4]. This is part of being in the “flow channel” in which tasks are not so hard they create apathy nor so easy they create boredom [5]. Since an expert performance in which one has reached mastery may eventually become a boring task, continuing to reach flow states requires greater challenges and yields greater experiences.

Any flow seeking challenge requires three psychological constructs; concentration, emotion, and expertise [6], the latter of which is present when “little to no attentional resources are necessary for executing action sequences” [7]. Music performance itself is the activity of chaining action sequences into patterns which eventually flow into melodies. For players using the Special Language, expertise in reading the musical instructions is made simple enough to empower flow for a student who lacks the comprehension and regulation skills necessary to read traditional music notation.

Since transient hypofrontality is a state of mind one journeys to, it may be reasonable to theorize that the position before reaching the closed mental loop is one of hyperfrontality. Perhaps this occurs when the mind is flooded with constant negative thoughts which manifest into anxiety and depression. Anxiety & depression are not exclusive to people with autism and other special needs. The National Institute of Mental Health published data showing that 31% of US adults experience an anxiety disorder at some time in their lives [8]. While this paper will focus on special needs learners, a greater quality of life is attainable through flow at the piano for individuals

with and without disabilities. It is even possible to use transient hypofrontality to combat the symptoms of depression and anxiety in the general population.

Hypothesis

Using the Special Language, developing expertise, repetitive practice, autonomous pattern development, and closed mental loop which neuro-typical learners commonly achieve through traditional music education paths can also be achieved through the Special Language. When attempting to prove that an individual with pervasive and profound disabilities has reached a flow state at the piano using the Special Language to play classical music, seeking the same biofeedback as the subjects of “*The Psychophysiology of Flow During Piano Playing*” [6] would provide the most definitive evidence. The study concludes that “a significant relation was found between flow and heart period, blood pressure, heart rate variability, activity of the zygomaticus major muscle, and respiratory depth,” all of which were beneficial outcomes. The hypothesis of this paper is if “*The Psychophysiology of Flow During Piano Playing*” [6] study was duplicated with the pervasively and profoundly disabled students who are long term users (three years minimum) of the Special Language, the results would be comparable.

What is the Special Language?

It is widely understood that the challenges of learning to play the piano using traditional notation are generally overwhelming and the difficulty leads most to quit before reaching truly rewarding goals. While this reality exists for the general population, it is surely present, if not more challenging, for the special needs learning community. These challenges are an impediment on the path to the expertise and action sequence development for playing the piano in a state of flow.

Traditional music notation uses a complex and centuries old system of lines, dots, circles, symbols, spaces and rules to communicate three main instructions- which note to push, which finger to use and how long to hold for. While there are many other factors involved in music performance, this paper focuses on the main three. Here’s how exact instructions are deciphered-



1) Notes are determined by where the circular symbol is located on a set of lines and spaces in between the lines. 2) Beats are determined by defining characteristics of the circular symbol, including whether or not it is filled in or hollow, whether or not there is a line (or stem) at the side of the note, and whether there is a dot or flag attached. 3) Finger usage is determined by small numbers near notes which represent each finger (1 for the thumb, 2 for the pointer finger, 3 for the middle finger, 4 for the ring finger, 5 for pinky finger), but are only displayed on certain notes. For the notes without an identifying finger instruction, the instructions are unwritten and based on basic rules of finger patterns of optimal hand movement. Learning these rules and using them to the point where the rules are embedded in one's mind and fingers can take years. notes without an identifying finger instruction, the instructions are unwritten and based on basic rules of finger patterns of optimal hand movement. Learning these rules and using them to the point where the rules are embedded in one's mind and fingers can take years.

The Special Language requires certain adaptations to successfully communicate the same three main instructions, including a specifically labeled keyboard, colored rings to wear on fingers, and music written in the adapted language. Here's how exact instructions are deciphered-

1) Notes are determined by seeing a letter in each box and matching it to the same letter on a labeled keyboard. 2) Fingers are determined by seeing the color of the letter and using the finger with the same colored ring to press the letter. 3) Beats are determined by arrows which come after letters. If there is no arrow after a note, the player moves on to the next box to strike the next key, whereas if there is an arrow or arrows, the student holds for an extra beat (or pace) per arrow.

The approach of the special language not only simplifies note instruction, it eliminates the structural complexity of traditional notation, which creates an

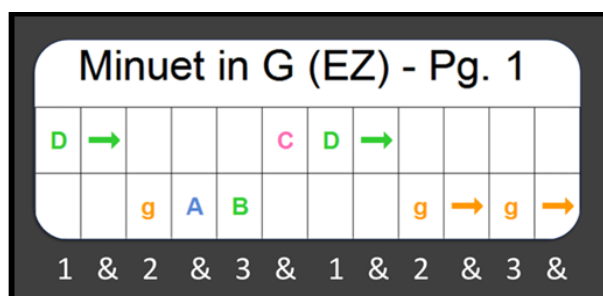
educational barrier to entry for most. The following is a side-by-side comparison of Beethoven's Fur Elise written in the special language and traditional notation:

Defining the contents of the closed mental loop while playing piano

While the closed mental loop may differ while pursuing a flow state through other endeavors such as chess or yoga, the "Piano Flow Cycle" represents the contents of the loop which must remain connected and uninterrupted while playing the piano. This cycle is the goal of either language of music: Since the first step, translation, is a major hurdle which many never overcome to functionally read traditional notation yet is so easy with the Special Language, the educational climb is much less steep using the latter and empowers one to almost immediately engage the Piano Flow Cycle to reproduce music. More importantly, it allows many to develop an instant level of expertise, allowing the practice and repetition toward muscle memory development and precise autonomous movement of the fingers.

Methods

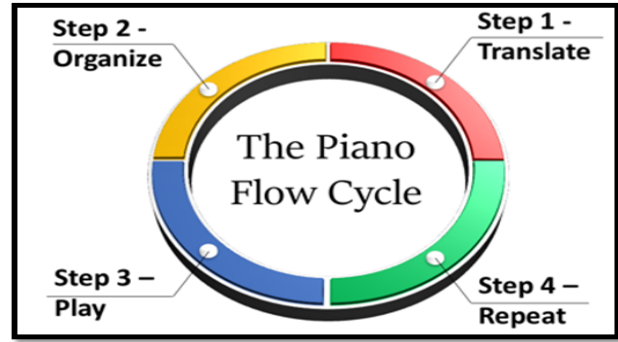
To mimic "The Psychophysiology of Flow During Piano Playing" study with individuals with pervasive



and profound special needs, partnership with a medical research center must be established so that biofeedback may be recorded. Then, arrangements to bring 3-5 students with said special needs who have been using the Special Language on a long-term basis (3 years minimum) together at the chosen research facility to run the study must be made. On the chosen research date, the student's teacher and family will prepare the student by familiarizing him/her with the surroundings of the performance room and the actual monitoring equipment they will wear. Equipment includes [6]:

- Eight Channel/16 bit, PowerLab™ DAQ, Chart 5 Pro Software.
- Ag/AgCl surface electrodes (ABMU® Blue Sensor).
- ML135 Dual Bio Amp, ADInstruments.
- ACA302, Star Micronics America, Inc.
- Piezo-electric respiratory belt transducer (MLT1133, ADInstruments).
- IR plethysmograph (MLT1020EC, ADInstruments).
- Other accessories.

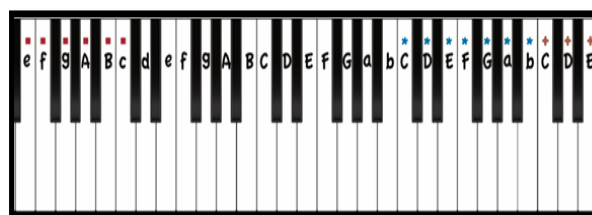
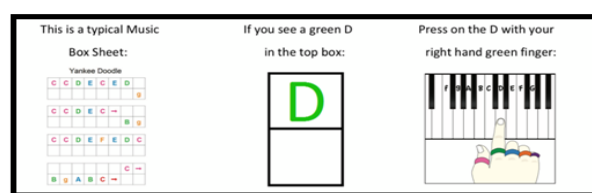
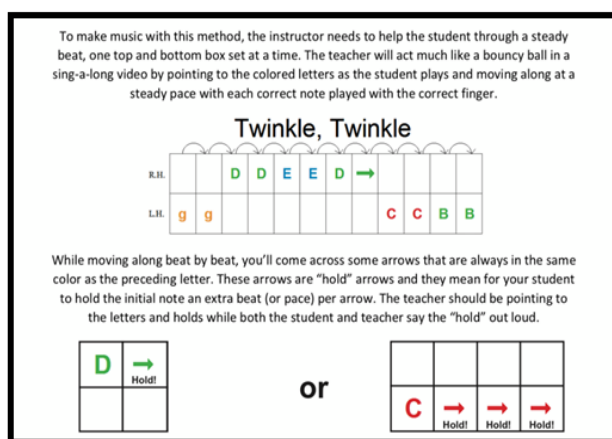
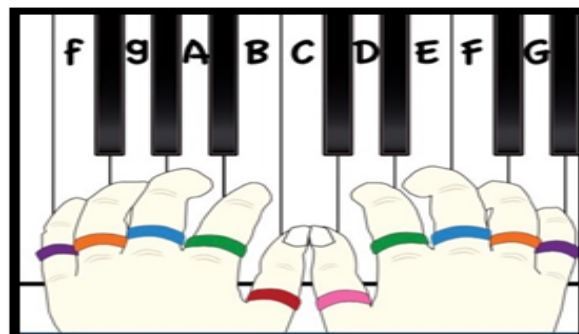
Once equipment is secured to the participant and researchers are confident to move forward, the student will begin to duplicate steps of the study with a warmup period of 15-20 minutes and then perform a song within their challenge/skill balance five times with 1-2 minutes between each attempt. Results will



be recorded between each step.

There are at least three current students (as of 4/21/2020) that would be ideal candidates for this study. These individuals are already performers using the special language, diagnosed with autism, considered mostly nonverbal, require behavioral intervention, and do not read traditional music notation. Their families have given permission to film performances and actively share aspects of their lives revolving around their son's music lessons.

Brendan Y and Jason W are featured in a 2019 documentary about the special language (Occupational Octaves-The Documentary). Their families describe their struggles firsthand in this ten-minute film. A few years earlier, Jake V was filmed as part of a 2016 news story aired on Fox 5 NY (Jake & Lee on Fox 5 NY) in the leadup to a special needs piano recital (2016 Occupational Octaves™ Recital). All three students were performers at this event.



There are certain adaptations needed to mimic the original study with Brendan, Jason, Jake, or a student with a similar background. Foremost is the use of the Special Language instead of traditional music notation. Using the Special Language requires a simple set of materials including a piano/keyboard, colored dry erase markers to properly label keys with, colored "Music Box" rings and music translated into the special language. The following are instructions to use the Special Language:

Evaluation of the hypothesis

Since the available videos provide mere anecdotal evidence, an appropriate set of standards must be adopted to understand whether someone is in a flow state. The Nine Dimensions of Flow, as identified by Dr. Mihaly Csikszentmihaly [9] is the standard used in "The Psychophysiology of Flow During Piano Playing" [6] and is also the appropriate standard for determining the same with special needs learners. The nine dimensions of flow are organized as follows [9]: 1) Challenge/skill balance--an activity cannot be so easy that it creates boredom, nor so

difficult that it creates anxiety. 2) Action-awareness merging--actions feel automatic and little or no attentional resources are required for executing action sequences. 3) Clear goals. 4) Unambiguous feedback. 5) High concentration. 6) Sense of control. 7) Lack of self-consciousness-self-reflective thoughts and fear of social evaluation are absent. 8) Transformation of time--Time may seem to move faster or slower than usual. 9) Autotelic experience--an induced state of positive affect, which can make a task intrinsically rewarding, that is, performing the task becomes a goal in itself.

The first six dimensions are observable. For example, if a song is too difficult to perform, one can observe a player making mistakes he or she cannot correct, a lack of contextual ocular motor movement, or a display of apathy. This would suggest the challenge/skill balance has not been achieved, goals may not be clear, a sense of control is not felt, nor is concentration high. Alternatively, the last three dimensions are based on the testimonials of players, which are either unavailable or unreliable when coming from students with high support needs. For this reason, it is important to attempt to prove the

state of flow through a biofeedback-based study, such as the methods of *The Psychophysiology of Flow During Piano Playing* [6]. Until there is new data on special learners playing in flow using the special language, determining whether a student has engaged the Piano Flow Cycle in an uninterrupted and repetitive manner should be the main focus of research. If a student is playing the piano without structural errors and displaying the desirable and observable characteristics of flow, they are likely experiencing the benefits laid out in the original study.

Upon conducting the proposed study, other issues related to Autism may arise. These complications will be unrelated to the ability to read the Special Language or engage a Flow state. For example, a student may become distracted and need to be redirected to the music. While visual redirection is acceptable because it is in response to a symptom of disorder, telling the student the name of the note during the redirection would be unacceptable because acquisition of instruction is the student's responsibility.

For the purposes of this study, a YouTube playlist has been created to show numerous performances and lessons featuring Brendan, Jason, and Jake (Brendan, Jason, Jake, and Occupational Octaves™), so that the observable characteristics of transient hypofrontality and the first six dimensions of flow may be observed. It should be noted that because Brendan and Jake have memorized the color designations of the rings and how the keyboard is labeled, some clips may show them using the special language but not using all accessories.

Discussion

Levels of depression and failure loom large for individuals with special needs. "The rates of depressive disorders are high among individuals with ASD. Compared to typically developing individuals, individuals with ASD are 4-times more likely to experience depression in their lifetime" [9]. Therefore, it is likely that great levels of cortisol exist in their bodies. When in a state of flow, "large quantities of norepinephrine, dopamine, endorphins, anandamide, and serotonin flood our system" [3], which challenged individuals may find difficult to

induce. Any pathway to increase the hormones of happiness is worth great exploration as proving the flow state will more than likely yield an increased quality of life.

In addition to the aforementioned benefits of flow, the Special Language creates opportunities for teachers and therapists without a music background to reach clinical goals with their clients through music. With the arduous task of learning traditional notation no longer necessary, teachers & therapists can focus on non-musical goals to mitigate the impact of deficiencies. Individual goals on a student by student basis may include concentration, leisure, frustration tolerance, staying on task, self-regulation, organization of materials, hand stabilization, finger isolation, pacing, ocular motor accuracy and more. In the world of neuro-typical/traditional piano lessons, confusion over the complexity of traditional music notation may yield apathy that leads students to abandon the process. Avoiding this consequence is predicated on a student reaching the intrinsically rewarding experience of performance, which may lead students down paths where greater challenges lie. The limited number of neuro-typical beginner students who played classical music written in the Special Language and were subsequently taught traditional notation showed ease in learning to read the more complex language. Potential reasons for this positive outcome include student confidence which grows as a result of early successful classical performances (which may occur in a flow state) and use of the special language jargon which makes understanding traditional notation much simpler. Therefore, the special language has great potential to improve beginner piano playing and traditional note reading for students of the general population.

The choice to make special learners the focus of the hypothesis was made to highlight positive experiences of those with low skill sets and high depression levels however, depression is not exclusive to the special needs community. A language of music that is user-friendly for people with special needs is inherently user-friendly for neuro-typical individuals as well. Therefore, the special language makes flow accessible to almost anyone with basic color and letter matching skills. Widespread flow experiences would be of great benefit to society as individuals with and without

disabilities are experiencing stress and anxiety for which transient hypofrontality may be a tool to combat.

References

1. Dietrich, Arne. Functional neuroanatomy of altered states of consciousness: the transient hypofrontality hypothesis. *Consciousness and cognition*, 2003.
2. Psychology Today [Internet]. Flow states and creativity: can you train people to be more creative [cited 2020 March 18]. Available from: <https://www.psychologytoday.com/us/blog/the-playing-field/201402/flow-states-and-creativity>
3. Csikszentmihalyi M. Finding flow: the psychology of engagement with everyday life. *Basic Books*, 1997.
4. Csikszentmihalyi M. *Beyond boredom and anxiety*. San Francisco: Jossey-Bass Publishers, 1975.
5. Courchesne, Mouton, Calhoun, et al. Neuron number and size in prefrontal cortex of children with autism. *JAMA* 2011, 306: 2001–2010.
6. de Manzano Ö, Theorell T, Harmat L, et al. *The Psychophysiology of Flow During Piano Playing*, 1997.
7. National Institute of Mental Health [Internet]. Any anxiety disorder [cited 2020 March 18]. Available from: <https://www.nimh.nih.gov/health/statistics/any-anxiety-disorder.shtml>
8. Csikszentmihalyi M, Csikszentmihalyi M. *Flow: The Psychology of Optimal Experience*. New York: Harper & Row, 1990.
9. Hudson CC., Hal L, Harkness KL. Prevalence of depressive disorders in individuals with autism spectrum disorder: a Meta-Analysis. *J Abnorm Child Psychol* 2019, 47: 165–175.