

---

# BreathSenses: Towards Understanding Breathing Games

**Rakesh Patibanda**

Exertion Games Lab  
RMIT University  
Melbourne, Victoria  
Australia  
rakesh@exertiongameslab.org

**Florian 'Floyd' Mueller**

Exertion Games Lab  
RMIT University  
Melbourne, Victoria  
Australia  
floyd@exertiongameslab.org

**Matevz Leskovsek**

Breathinglabs.com  
Tehnološki park 19, Ljubljana,  
Slovenia, EU  
mat@breathinglabs.com

**Jonathan Duckworth**

RMIT University  
Melbourne, Victoria  
Australia  
jonathan.duckworth@rmit.edu.au

**Abstract**

In recent years attention has increased around digital breathing games via new technology that allows interaction between breathing and video games. While some breathing games use breath as a fun form of interaction, other games use breath to improve mental health aspects a player in order to reduce stress and anxiety. So far, little research has been devoted towards understanding the design of breathing games. To develop an understanding towards the design of breathing games, we begin by proposing a taxonomy depending on the factors of game genre, game design analysis based on the human body senses involved, breathing technique used, aim of the breathing technique, technology used to experience the game world and technology used to measure breathing. To demonstrate the strength of our taxonomy, we analyze example games and discuss how the novel taxonomy could help game designers to create breathing games.

**Author Keywords**

Taxonomy; Digital games; breathing; respiration; human body senses.

**ACM Classification Keywords**

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

**Note**

The full text has been submitted to the late-breaking work. This is a shorter version of the same pointing out to the relevant aims of the workshop. The full text will be provided on request.

## **Introduction**

Breathing is something that we do all the time and yet we are mostly not aware of it. Bringing our focus intentionally onto our breath we can learn to observe it without reacting to it, simply watching each breath as it happens [3]. Further, various breathing techniques and exercises are considered fundamental for the development of both physical and mental well-being [1, 6, 8]. Digital games offer promising opportunities for both the practice and research of breathing because the interactive nature of games allows for the development of experiential knowledge. This is important for breathing, as it will help players understand their breathing patterns and allow them to alter it if necessary [9].

## **Related Work**

In a study conducted by Krestina and Andrew, "The Journey to Wild Divine" was investigated as a biofeedback management tool to teach breathing skills to children with Attention-Deficit/Hyperactivity Disorder (AD/HD). The children played the game by manipulating their heart rate using breathing techniques taught in the game [2]. Spatial poem by Choi et al., offers a new type of visual interaction expressing the player's own creative narrative as a real-time visual by playing a musical instrument, which is an emotional human behavior. When a player blows the instrument, to make sounds, the blow changes into energy that makes the player walk continuously in a virtual space [4]. Marshall et al., explored the potential of breathing as an effective and engaging way to enable the control of individual seats on physical amusement rides. Tactics for designing rides in the future that could possibly incorporate breath control were proposed in their research [7]. Moraveji et al.,

state that feedback would help change the simplest behavior that matters and in our context, it is breathing [9]. His words about feedback point towards gaming as a potential way to change behavior [5]. This work inspired us to build the taxonomy towards understanding the design of breathing games. We call this the breathsenses taxonomy.

## **Future Opportunity**

While the breathsenses taxonomy informs game designers about how the discussed breathing games have been designed, it also helps them by showing the gaps that have been highlighted in orange color, indicating unexplored territory. Game designers who intend to design breathing games, can use the unexplored territory and design breathing games by involving more combinations of human body senses during gameplay. Game designers also have the opportunity to explore combinations of breathing techniques and technologies as shown in the breathsenses taxonomy. This might be possible by considering different combinations of human body senses that they want to involve during the gameplay.

## **Conclusion**

Although this might not be the only way, breathsenses taxonomy is one of the ways towards understanding the design of breathing games. We believe that it can act as a stepping-stone for game designers who intend to design breathing games. Our next step, post this work is to design and develop our own breathing games and receive feedback from relevant audiences. With our work, we hope that game designers start designing breathing games to help people breathe better.

Game Genre	Example Game	Breathing Technique Used	Aim of the Breathing Technique	Game Design Analysis using MDA Framework Based on Human Body Senses Involved During the Gameplay							Technology Used To		
				Touch	Movement	Sight	Hearing	Taste	Smell	Balance	Experience The Game World	Measure Breathing	
Open World	Deep	Diaphragmatic Breathing	Reduce Stress, be Calm & Playful	M	Movement of the belly detects the breathing	A circle on the screen indicates the players breathing	The ambient sound of an underwater world keeps the player immersed				Uses Oculus Rift VR headset to immerse the player	A custom made waist belt is placed around the players belly to measure breathing	
				D	Breath rate is fed back into the game	The circle expands and contracts while the player breathes	The movement in the water is supported by the sound						
				A	Calm, Joy	Calm, Joy	Calm, Joy						
Audio	Deep Sea	None	Be A Playful Experience	M		The sense of sight is obscured by the mask worn by players	The players hold their breathe to hear alien sounds.				Custom made mask is used to plunge them into a world of darkness	A microphone inside the mask donned by the player measures breathing	
				D		This enables players to focus on ambient sounds in the game.	Aim and shoot into darkness hoping to hear the sound of the alien die						
				A		Fear, Excitement	Fear, Joy & Excitement						
Casual	Flowy	Breath Retaining	Reduce anxiety while being playful	M	Players swipe and collect coins while breathing		Players replicate the breathing by looking at the screen				Uses a smart phone to immerse the player	Flowy does not measure breathing of the player	
				D		Players replicate the characters breathing movement		Ambient sound of the character breathing creates an illusion of					
				A	Joy, Excitement	Calm	Joy, Excitement	Joy, Excitement					
Casual, Racing, Music	Breathing Games by Breathing Labs	Pursed Lip Breathing	Reduce breathing and stress related problems while being playful	M	Players breathing is sensed by the device and taken as an input						Uses a smart phone to immerse the players	Breathing+ is a headset used to measure breathing	
				D			Dynamics range from speeding, to intensity of the wind instrument and more						
				A			Joy, Excitement						

**Table 1:** The BreathSenses Taxonomy: Towards Understanding Breathing Games.

## References

1. In Hand Mobile App helps bring balance to our daily stresses and anxieties. In Hand App.
2. Amon, K.L. and A. Campbell, Can Children with AD/HD Learn Relaxation and Breathing Techniques through Biofeedback Video Games? Australian Journal of Educational & Developmental Psychology, 2008. **8**: p. 72-84.
3. Bishop, S.R., et al., Mindfulness: A proposed operational definition. Clinical psychology: Science and practice, 2004. **11**(3): p. 230-241.
4. Choi, J. and S.H. Hong. SPATIAL POEM: A new type of experimental visual interaction in 3D virtual environment. in Computer-Human Interaction. 2008. Springer.
5. Kiili, K., Digital game-based learning: Towards an experiential gaming model. The Internet and higher education, 2005. **8**(1): p. 13-24.
6. Lee, P.S., Theoretical bases and technical application of breathing therapy in stress management. Journal of Korean Academy of Nursing, 1999. **29**(6): p. 1304-1313.
7. Marshall, J., et al. Breath control of amusement rides. in Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. 2011. ACM.
8. Raab, K., Mindfulness, self-compassion, and empathy among health care professionals: a review of the literature. J Health Care Chaplain, 2014. **20**(3): p. 95-108.
9. Wongsuphasawat, K., A. Gamburg, and N. Moraveji. You can't force calm: designing and evaluating respiratory regulating interfaces for calming technology. in Adjunct proceedings of the 25th annual ACM symposium on User interface software and technology. 2012. ACM.