

Music, technology and mental health

A fertile but challenging ground for art, science and entrepreneurship.

Pierre Lonchamp

Caroline Pegram, Bahareh Nakisa, Steven Umbrello



Background

- Ms. Physics and Eng., PhD Industrial engineering / Design research
 - Incl. Cognitive psychology
- Engineering management / Medical devices
- Regulatory Affairs and Quality Assurance
 - FDA, TGA, EU
 - HW / Systems
 - SW / AI

- AI - Singularity - Tech Ethics

- Musician & Producer
- Foreign language, accent
 - Auditory Processing Guinea Pig



Motivation

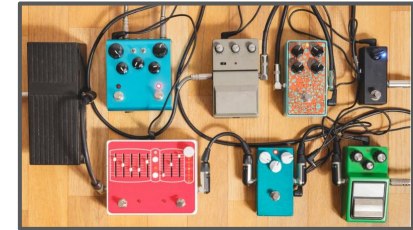
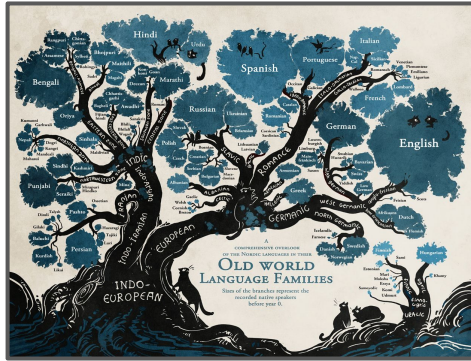
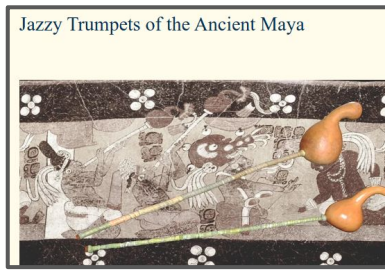
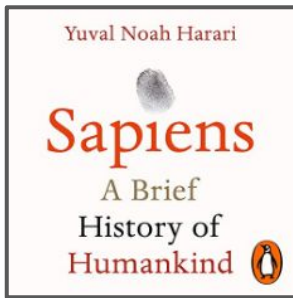
- ATHT.ORG
 - NFP
 - 2 Sides
- Rejuvenate my research and education profile
 - Value Engineering - Co-evolution / Design
 - Opportunity for silo breaking
- DIY (Mental) Health
 - Resolving cognitive dissonance
 - Values
 - Contributing back
 - Intelligence - Conscience/Consciousness
 - Audio/Music



Contents

- Context
- Overview of a few startups
- Critical Analysis - Risk, challenges and opportunities





RESEARCH ARTICLE

What music makes us feel: At least 13 dimensions organize subjective experiences associated with music across different cultures

Alan S. Cowen, Xia Fang, Disa Sauter, and Dacher Keltner
 + See all authors and affiliations

PNAS January 28, 2020 117 (4) 1924-1934; first published January 6, 2020; <https://doi.org/10.1073/pnas.1910704117>



Emotional bandwidth

MEN ENCOURAGED TO CHALLENGE STEREOTYPES WITH NATIONAL 'BOYS DO CRY' CAMPAIGN VIA THE HALLWAY

NOVEMBER 22 2021, 8:06 AM | BY LYNCHY | 28 Comments



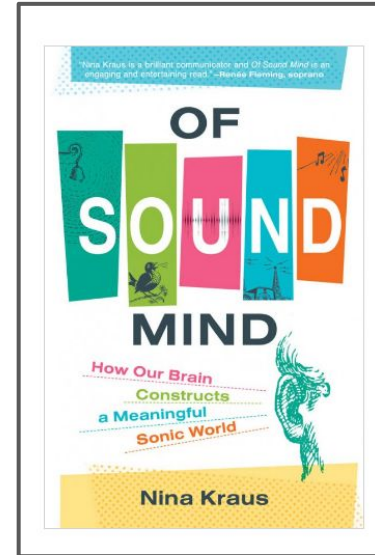
A nationwide campaign challenging societal views that men should always put on a brave front launches today, with a transformed version of The Cure's iconic song 'Boys Don't Cry', created by The Hallway.

Name that tune: Brain takes just 100 to 300 milliseconds to recognize familiar music

Date: October 30, 2019

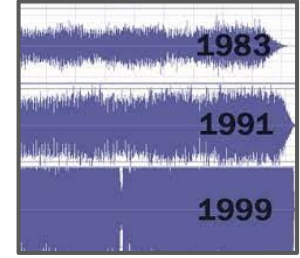
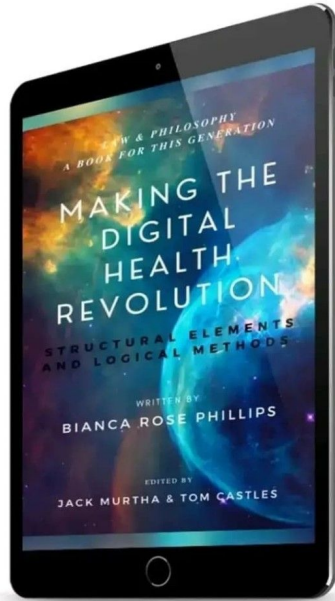
Source: University College London

Summary: The human brain can recognize a familiar song within 100 to 300 milliseconds, highlighting the deep hold favorite tunes have on our memory.



Hearing is the “speediest” of our sense





- From Scarcity to abundance....
 - NFTs



A fertile ground: the wellness market

Feeling good: The future of the \$1.5 trillion wellness market



Today's consumer views wellness across six dimensions.



Better health

Extends beyond medicine and supplements to include medical devices, tele-medicine, and remote healthcare services, as well as personal health trackers



Better fitness

Was steadily increasing over time before experiencing some upheaval over the past year, with many consumers struggling to maintain pre-COVID-19 fitness levels



Better nutrition

Has always been a part of wellness, but now consumers want food to help them accomplish their wellness goals in addition to tasting good



Better appearance

Primarily relates to wellness-oriented apparel ("athleisure") and beauty products (skincare and collagen supplements), but also includes service-oriented offerings like nonsurgical aesthetic procedures



Better sleep

Now goes beyond traditional sleep medication, like melatonin, to app-enabled sleep trackers and other sleep-enhancing products



Better mindfulness

Has gained mainstream consumer acceptance relatively recently, with meditation-focused apps and meditation-oriented offerings

McKinsey
& Company




← → ↻ 🏠 🔒 brain.fm/science ☆ 👤 📄 📧 ⚙️ 👤 ⋮

Tested on Brain and Behavior

PHASE LOCKING VALUE (HIGHER IS BETTER)

4000 6500 9000 11500 13000





PINK NOISE **SPOTIFY** **BRAIN.FM**

We collaborate with academic institutions to run experiments. We look at the effects of our technology on the brain, using fMRI and EEG, and also run large-scale behavioral tests, measuring performance on simple games. Our experiments always include a control condition ('placebo') of the same underlying music without Brain.fm technology applied, so we can be sure our tech is what makes the difference.

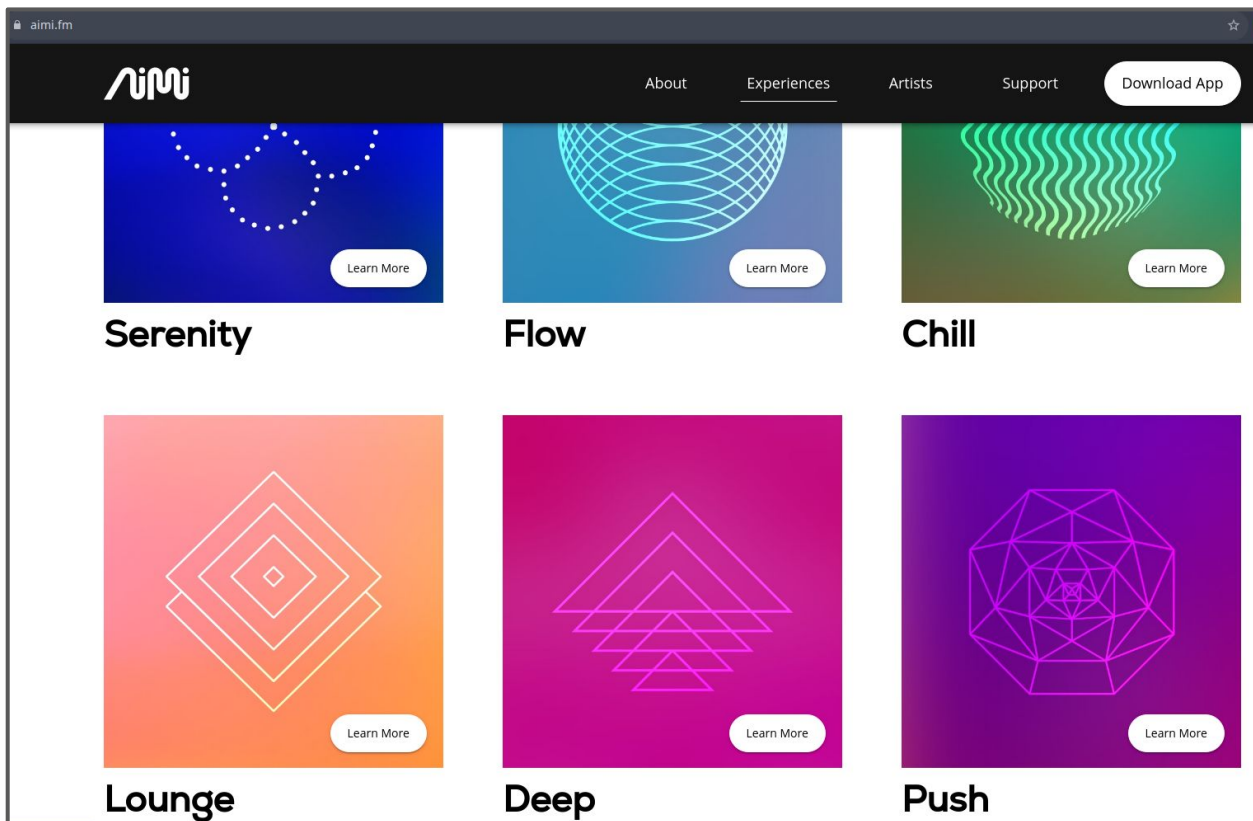
Human composers enabled by science and AI tools

Unlike 'muzak' systems that generate infinite quantities of mediocre music, our in-house composers make real music with human warmth. These musicians are enabled with patented tools and techniques that apply the science to the music.

Join 150,000+ users who **control their mental state on demand**

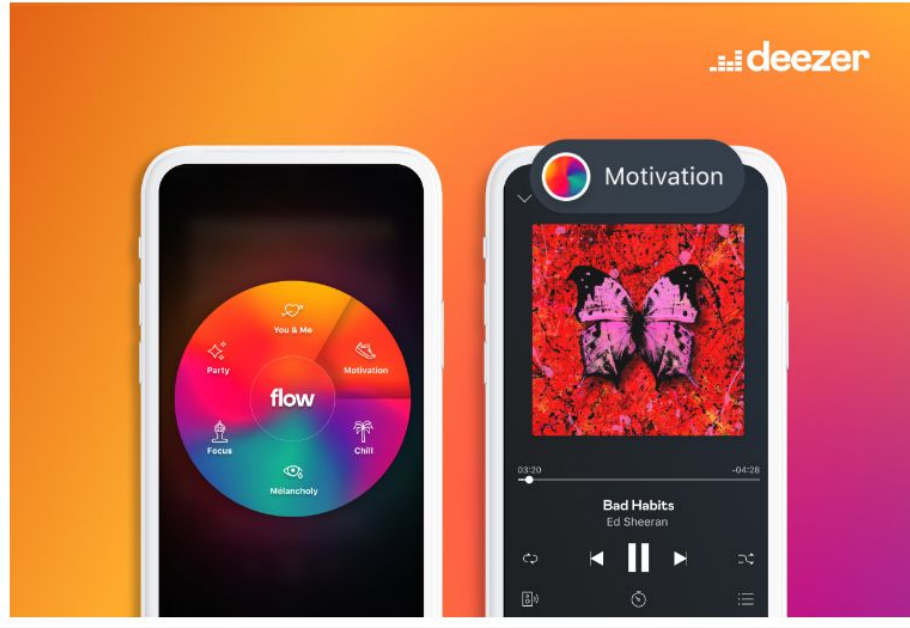




GET IN TOUCH WITH YOUR FEELINGS WITH FLOW MOODS

POSTED BY ISOBEL HAMBLETON | OCTOBER 6, 2021 | GB, GLOBAL, PRODUCT, UK, US

New Emotional Jukebox matches your music to your mood





LifeScore

HOW IT WORKS

APPLICATIONS

PEOPLE

PRESS

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APPLICATIONS

WELLNESS


LifeScore brings the adaptive music experience to wellness and health by aiding activities, focus, relaxation, and mindfulness. It can adapt to information about the physical environment and how your body and mind are doing, and give you feedback to get into the state you want.



https://www.focusatwill.com

focus@will How It Works Pricing Workplace Reviews Sign In **Free Trial**













Music to help you focus. Optimized by science.



Find your perfect flow tunes with the free quiz below:

Take the Focus Quiz

This is what focus sounds like

 NatureBeat	 The Deep	 The Drop	 Symphonica	 Tranquility	 Organica
 PowerTool	 Bach Beats	 Edwardian	 Atmosphere	 Aquascope	 Cinematic

- o Created by **platinum selling music producers**
- o Backed by **world-class neuroscientists**
- o Thousands of hours of **unique tracks**
- o More than **2,000,000 subscribers**



“Mood” music tech applications

- No specific therapeutic claim
 - Only “Wellness” claim (ADHD lifscore?)
- “Backed” by science
 - Volunteer / sale argument
 - Various levels of “validation” claimed
- Data input/Config
 - Predetermined
 - Ux
- Music creation and AI:
 - Un-named musicians
 - “Enabled” by proprietary tools - Brain.fm
 - They compose the “building blocks” that AI put together - Lifscoremusic.com
 - Named artists
 - Label - Aimi.fm
 - App is only selecting - Deezer.com
 - Unsure
 - Focusatwill.com
- B2C and B2B



Technology Enhanced Meditation



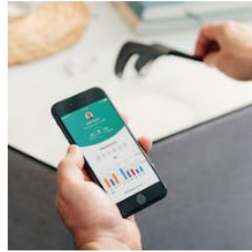
The Art of Focus

Muse translates your mental activity into the guiding sounds of weather to help you find focused calm. Busy mind? Stormy weather. Calm mind? Peaceful weather.

[Learn More >](#)

The First of It's Kind

Discover your mind-body connection in a completely unique way: through powerful, accurate real-time feedback on brain activity, heart rate, breathing, and body movements.



au.kokoon.io/products/nightbuds?country=aus®ion=au&gclid=CjwKCAIA7dKMBhBCEiwAO_crFFm5aoBYB_xzCjQZr06f1f1MBY5ED0wwwV1AZHDNTcDqOVGne2dRoCuG0QAVD_BWE

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Smart earbuds for better sleep

Experience sleep like never before - intelligent audio to help you improve and enjoy your sleep

◻ Watch the film

Comfort in bed
Sitting snug in the ear, these tiny, soft earbuds are perfect for side sleepers.

Noise masking
Intelligent noise-masking and passive noise blocking help mask out disturbances

Sleep-sensing
Sensors monitor your sleep providing personalized coaching, insights and tips specific to you.

Adaptive audio
Audio auto-fades as you drift off to sleep.

Kokoon curated playlists available on

Spotify Apple MUSIC YouTube

and more!

EEG-Powered Meditation & Sleep

Muse is a brain-sensing headband that uses real-time biofeedback to help you refocus during the day and recover overnight.



“Wellness/consciousness” music tech applications

Biofeedback

- Specific wellness claims
 - Sleep
 - Meditations
- “Backed” by science
 - Volunteer / sale argument
 - Various levels of “validation” claimed
- Data input/Config
 - Close loop
- Music/sound creation and AI:
 - Opaque.
 - Un-named if any
 - Binaural Beats, background to mediation content etc
 - AI focus on the close loop
- B2C and B2B

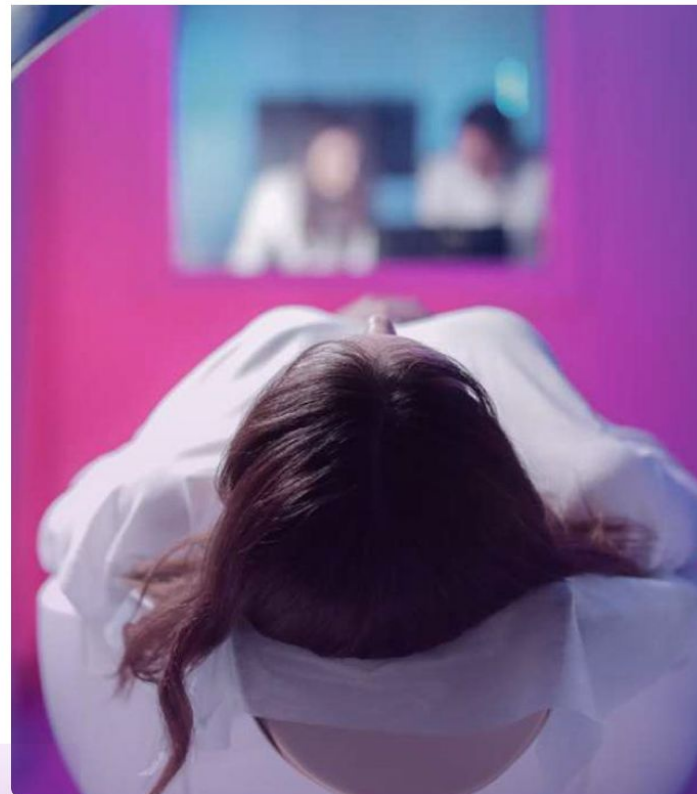


A New Approach to Anxiety

In our [Adult Acute Anxiety Study](#), a single 24-minute listening session produced more significant reductions in somatic (31% vs. 6%, $p=0.03$) and cognitive anxiety (21% vs. 15%, $p=0.05$), compared to pink noise or auditory beat stimulation.

LUCID's music technology has also indicated a greater ability to reduce stress (21% vs. 12%, $p=0.05$) and boost positive mood (12% vs. 4%, $p=0.05$), as compared to the top relaxation playlist on a major music streaming platform.






[Learn More](#)



medimusic.co

*Music has been proven to reduce anxiety by up to 44%,
pain by 29% and a resulting reduction in the need for
relevant drugs by 24%*

(derived from an analysis of [PubMed](#) and [Cochrane](#) Library publications)


				
MediMusic's fingerprinting algorithms scientifically mimic the human brain's response to individual music tracks.	Within a couple clicks personalised playlists are auto-created that cause a positive physiological and emotional response.	By using an optional heart rate monitor our Artificial Intelligence-driven Digital Drip™ analyses a listener's physiological response to the playlist tracks.	The Digital Drip knows what that response should be. If the heart rate falls outside of the expected threshold subsequent tracks are swapped out in real-time to bring the heart rate back in line.	The resulting data is captured by the Digital Drip for future use by a machine learning process to refine subsequent playlist creation.



CNN politics The Biden Presidency Facts First US Elections

The hard math on the new \$56,000 Alzheimer's drug

Analysis by [Zachary B. Wolf](#), CNN
Updated 0011 GMT (0811 HKT) July 21, 2021



FDA approves an Alzheimers drug 01:45

A version of this story appeared in CNN's *What Matters* newsletter. To get it in your inbox, sign up for free [here](#).

(CNN) — The new Alzheimer's drug Aduhelm costs \$56,000 per person, per year -- so much that it would [affect the economics of Medicare](#).

Ad Nuheara

Our Big Sale

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60 MINUTES

Despite his Alzheimer's, Tony Bennett prepares to perform with Lady Gaga



music
health

Music as a therapy, made easy.

Take control of your
mental and physical
wellbeing!



vera



**Black Friday Sale
in Australia!**

Purchase the Vera and Google Nest Mini bundle
(colour of your choice), delivered straight to your
door.

vera

Coming soon

Vera - the right music for the ageing
brain. [Learn more.](#)

Coming Soon - the easiest way to
manage your anxiety.



“Therapy” Music Tech Applications

- Specific therapeutic claim
 - Anxiety
 - Pain
 - Cognitive functions
- Generic therapeutic claims
 - Depression, Blood Pressure, Stress, Sleep, Cognitive functions, Memory, Motor functions
 - Cost of care, Quality of care
 - Improves medication efficiency, Smooths digestion, Improves Breathing, Reduces heart rate, Lowers blood pressure
 - Cortisol, Oxytocin, Dopamine, Increases Immunoglobulin A
- More “Validated” specific
 - Volunteer / Reimbursement
- “Assumed” generic
- Data input/Config
 - Predetermined
 - Ux / Enrolment / Professional
 - Close-loop : MediMusic (HR)
- Music creation and AI:
 - Un-named musicians (+AI?)
 - We utilize non-vocal, instrumental music that is not available on other major streaming platforms to prevent nostalgic bias and maximize therapeutic impact. to better optimize for the emotional intent without fear of bias. (Lucid)
 - Named artists
 - App (AI) is only selecting / tagging - (Vera / Medimusic)
 - +Close-loop adaptation (Medimusic)
 -
- B2C and B2Clinicians (Insurance)

Long-Known Music Exposure Effects on Brain Imaging and Cognition in Early-Stage Cognitive Decline: A Pilot Study [Cite](#)

Article type: Research Article

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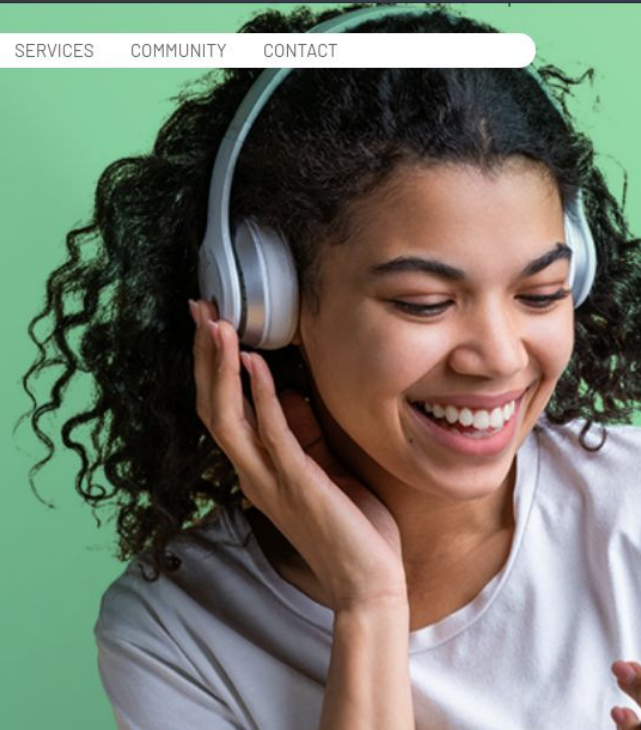
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WITH TUNEFORK'S
PERSONALIZED
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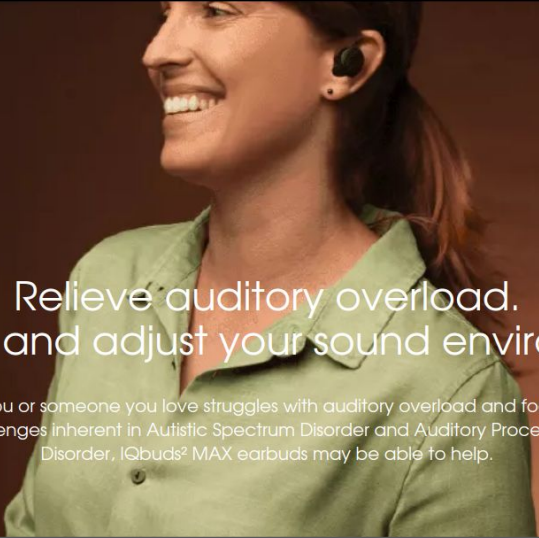
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nuheara.com/how-it-helps/autism-auditory-processing-disorder-earbuds/

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NUHEARA PRODUCTS HOW IT HELPS HEARING CHECK PRESS REVIEWS VIDEOS GOVT FUNDING NEWS ABOUT SUPPORT SHOP NOW



Relieve auditory overload. Control and adjust your sound environment

If you or someone you love struggles with auditory overload and focus challenges inherent in Autistic Spectrum Disorder and Auditory Processing Disorder, IQbuds² MAX earbuds may be able to help.

Nuheara earbuds can assist in offering relief from tinnitus symptoms.



Auditory Enhancement Apps

- Specific audiological claims
 - Tinnitus, Misophonia, Auditory Processing Disorder.
 - Mental Health Comorbidities
- “Validated”
 - Various levels of “validation” claimed
 - Reimbursement / NDIS etc
 - “Not a hearing aid”
- Data input/Config
 - Pre-set + config/personalisation
- Music/sound creation and AI:
 - Irrelevant
- B2C and B2B



<https://www.musimap.net> :

Musimap: Home

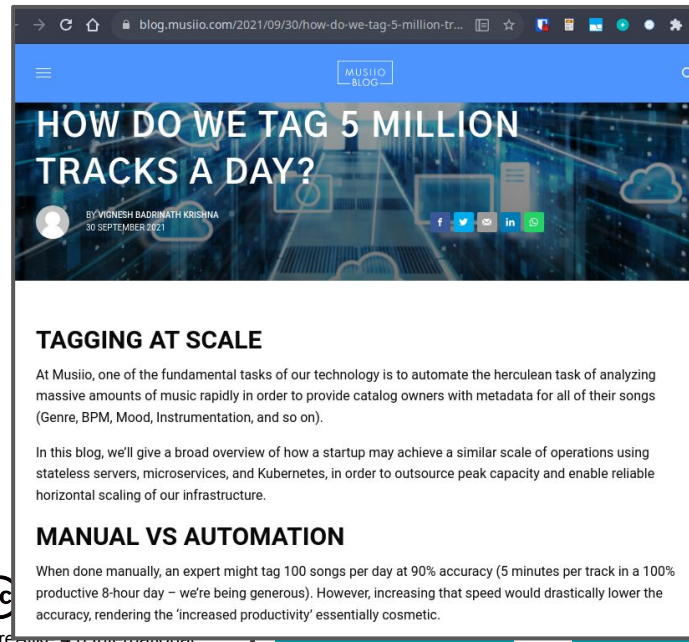
Musimap is an Emotional Artificial Intelligence company leveraging 20 years of manual tagging efforts. Picto. Sophisticated. We provide automated engines to ...

AI Startup Backed By Quincy Jones Gets Acquired 'To Continue Changing The Way We Consume Music'

 Samantha Dorisca. 12 Oct 2021.

A music mogul like Quincy Jones backing an “emotional” artificial technology (AI) music startup sounds like a match made in heaven.

The startup — Musimap — is on a mission to develop effective music roadmaps for its users through AI. The automated engine leverages automated engines and metadata enhancement to generate a playlist that has a familiar music palette to correspond with the personality profile.



blog.musio.com/2021/09/30/how-do-we-tag-5-million-tr...

MUSIO BLOG

HOW DO WE TAG 5 MILLION TRACKS A DAY?

BY WINESH BADRINATH KRISHNA
30 SEPTEMBER 2021

TAGGING AT SCALE

At Musio, one of the fundamental tasks of our technology is to automate the herculean task of analyzing massive amounts of music rapidly in order to provide catalog owners with metadata for all of their songs (Genre, BPM, Mood, Instrumentation, and so on).

In this blog, we'll give a broad overview of how a startup may achieve a similar scale of operations using stateless servers, microservices, and Kubernetes, in order to outsource peak capacity and enable reliable horizontal scaling of our infrastructure.

MANUAL VS AUTOMATION

When done manually, an expert might tag 100 songs per day at 90% accuracy (5 minutes per track in a 100% productive 8-hour day – we're being generous). However, increasing that speed would drastically lower the accuracy, rendering the 'increased productivity' essentially cosmetic.



Backend Apps

- B2C
- Size
- Tagging
- Opaque



Opportunities, Risks and Challenges



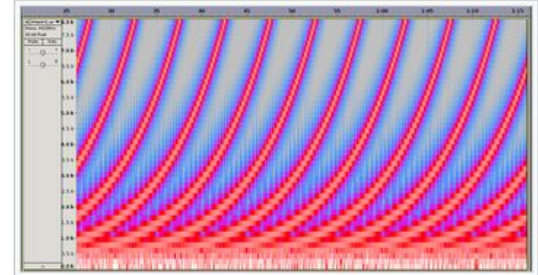
Subliminal messaging ??



Shepard tone

From Wikipedia, the free encyclopedia

A **Shepard tone**, named after [Roger Shepard](#), is a sound consisting of a superposition of sine waves separated by octaves. When played with the bass pitch of the tone moving upward or downward, it is referred to as the *Shepard scale*. This creates the auditory illusion of a tone that seems to continually ascend or descend in pitch, yet which ultimately gets no higher or lower.^[1]





by **TechRepublic Staff** | **Dan Patterson** in **Security** 
on July 30, 2020, 11:37 AM PST

Read about the saga of Facebook's failures in ensuring privacy for user data, including how it relates to Cambridge Analytica, the GDPR, the Brexit campaign, and the 2016 US presidential election.



← → ↻ 🏠 <https://www.theverge.com/2019/4/17/18299563/ai-algorithm-music-law-copyright-human> 📄 ☆ 📧 ⬇

THE VERGE TWITTER FACEBOOK

HOW CAN ANYONE PROVE AN ALGORITHM WAS TRAINED ON THE SONG OR ARTIST IT ALLEGEDLY INFRINGES ON?

Even if an AI system did closely mimic an artist's sound, an artist might have trouble proving the AI was designed to mimic them, says Aimonetti. With copyright, you have to prove the infringing author was reasonably exposed to the work they're accused of ripping off. If a copyright claim were filed against a musical work made by an AI, how could anyone prove an algorithm was trained on the song or artist it allegedly infringes on? It's not an easy task to reverse engineer a neural network to see what songs it was fed because it's "ultimately just a collection of numerical weights and a configuration," says Bailey. Additionally, while there are scores of lawsuits where [artists were sued by other artists for failing to credit them on works](#), a company could say its AI is a trade secret, and artists would have to fight in court to discover how the program works.




The UK's Music Managers Forum (MMF) has release an updated version of its guide to mental health for managers and artists.

Unveiled yesterday as part of the online The Great Escape conference, it's an update of a report originally published in 2017.

The new guide was co-written by one of the industry's key experts on mental health and music, Sam Parker, and focuses on topics including managing stress, anxiety and depression, as well as alcoholism, drug dependency and setting healthy boundaries.



John Legend is meditation app Headspace's new 'chief music officer'

 mindsethealth.com/jobs/audio-engineer-producer

Mindset



Spark your
creativity with

Arcade Fire.

Shimmering orchestral sounds to
keep you motivated and inspired.



Arcade Fire launch 45-
minute track in
mindfulness app
Headspace



London Grammar
launches 'meditative
mixes' on Calm



What of the regulators?

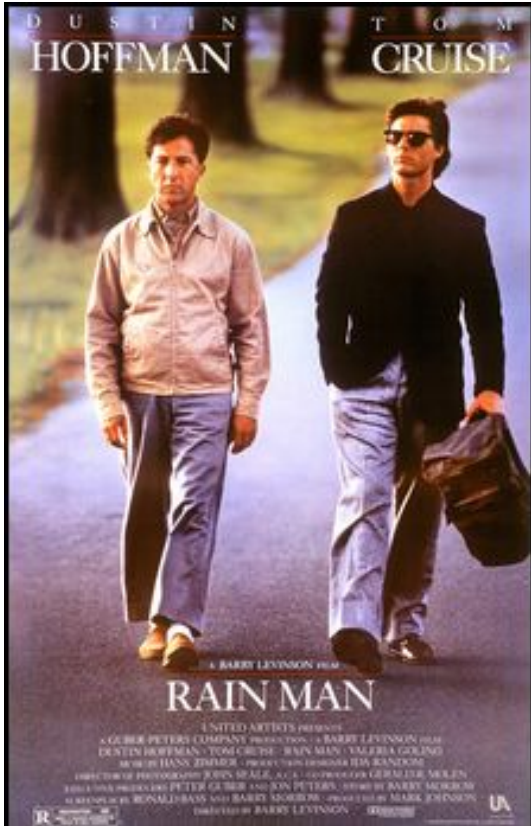


Bob Marshall Sings "The Regulatory Blues" (You'll want to hear this.)

*I had a pre-submission meeting
so I went down to Silver Springs.
I took documents, and drawings,
and lots of other things.
They said, "Go home, boy,
Wait until the telephone rings."
I got the Regulatory Blues.
About to lose my mind,
I'm waiting on some data
no one can seem to find.
Now my 510(k) submission
is running three months behind.
I got a call last week.
Said they were coming for an inspection.
Someone down at the hospital
got a real bad infection.
Now they're telling me
I got to recall the whole collection.
Tried to renew my registration.
I just sent it in the mail.
Because every time I went online,
their website would fail.
Now they're putting me in handcuffs,
and taking me to jail...*



Conclusion(s)



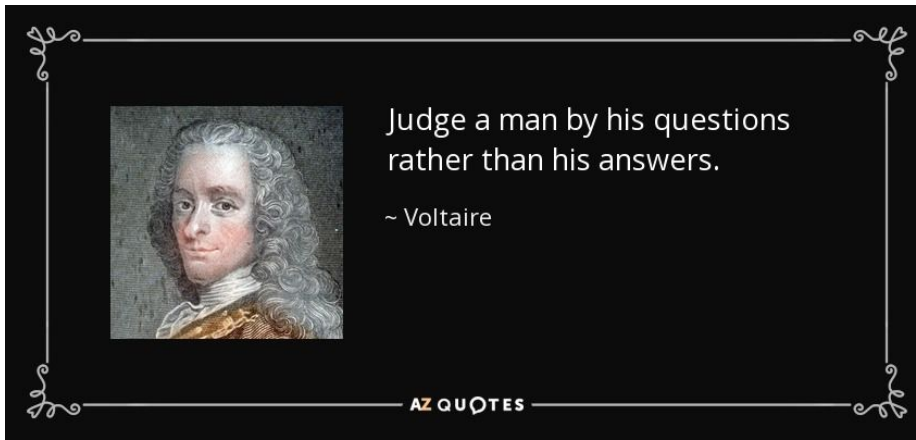
Conclusion(s)



Conclusion(s)

- Definitions:
 - Intelligence
 - [[Max Tegmark]]
 - Neuronal arrangements - independent completely of the "HW"
 - DATA the best vehicle for intelligence
 - Conscience
 - [[Max Tegmark]]
 - Ability to have subjective experiences
 - Music/arts may be the best vehicle for a [[conscious society]]
- Rabelais
 - "Science sans conscience n'est que ruine de l'Ame"





<https://www.linkedin.com/groups/13990791/>

(Group Music, Health and Technology)

www.atht.org

@TranspaTech

www.diapason.consulting

@DiapasonConsult



www.lilialaska.com

Melbourne 13 Feb 2022

Sydney 19 Feb 2022

www.sofrenchysochic.com

[W](#)









Earbuds

Please note: IQbuds² MAX is not a hearing aid

The Australian Government Hearing Services Program (HSP), (formally OHS), exists to ensure that all eligible Australians are receiving the funding they need to gain access to quality hearing health care.

Am I eligible to receive subsidised hearing services?






If you fall into any of the following categories, you may be eligible to receive a range of free services and fully or partially subsidised hearing devices under the HSP.

- A pensioner Concession Card holder
- Receiving Sickness Allowance from Centrelink
- A **Department of Veterans' Affairs (DVA) Gold Card holder**
- A **Department of Veterans' Affairs (DVA) White Card holder** issued for specific conditions including hearing loss
- A member of the Australian Defence Force
- A **National Disability Insurance Scheme (NDIS)** participant


How can I purchase IQbuds² MAX through HSP?

If you are eligible you can purchase the Nuheara IQbuds² MAX under the Alternative Listening Device (ALD) category which is Fully Subsidised.

The IQbuds² MAX is one of the worlds smartest hearing buds. It has all the best features of a true wireless earbuds with the advanced hearing technology that allows you to hear what you want to hear. The unique Ear ID™ functionality is a clinical grade hearing assessment that automatically personalises your IQbuds² MAX to your unique hearing profile.

FEATURES	 IQbuds ² MAX	 HEARING AID ³	 Premium HEARING AID ³	 PSAP ²	 High End EAR BUDS ¹
Bluetooth Connectivity	✓	✗	✓	✗	✓
Take Calls & Stream Music	✓	✗	✓	✗	✓
Rechargable	✓	✗	✓	Some (\$300+)	✓
Sound Amplification	✓	✓	✓	✓	✓
ANC (Active Noise Cancellation)	✓	✗	✗	✗	✓
Conversation Enhancement	✓	✓	✓	✗	✗
External Noise Supression	✓	✗	✗	✗	✓
3 Directional Microphones	✓	✓	✓	✗	✗
In Home Personalization / Calibration	✓	✗	✗	✗	✗
Tap Touch Controls	✓	✗	✗	✗	✗
Usage	Situational	All Day	All Day	All Day	Leisure
Pricing ⁴	USD \$499	USD \$3000+	USD \$5000+	USD \$50-299	USD \$200



https://www.rollingstone.com/pro/news/... 

September 29, 2021 9:01AM ET

Can Music Rehabilitate Stroke Victims? Universal Music Group Thinks So

The company is partnering with a medical startup in what it calls the first-ever prescription music license

The basis of MedRhythms' research comes from what's called auditory motor entrainment, a subconscious link between a person's auditory and motor systems. The average person displays such a link when they nod their head or tap their foot to the beat of a song. Those with neurological injuries or diseases like strokes or Parkinson's disease often have a damaged motor system, but because of the link with the auditory system, Harris says, music works as a strong external stimulus to activate the motor system more effectively once again. The process could aid in neuroplasticity, the process that allows our brains to adapt and learn even as we grow older.

During a session, MedRhythms patients hook up sensors to their shoes and listen to music through an app with headphones while the program tracks patients' gait and lets algorithms change the music according to rhythm. Patients walk to the music, which speeds up or slows down accordingly.



Original Research | [Open Access](#) | [Published: 28 September 2021](#)

Effects of Three Genres of Focus Music on Heart Rate Variability and Sustained Attention

[Ulrich Kirk](#) , [Christelle Ngnoumen](#), [Alicia Clause](#) & [Clare Kennedy Purvis](#)

Journal of Cognitive Enhancement (2021) | [Cite this article](#)

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Journal of Medical Engineering & Technology >

Volume 45, 2021 - Issue 7

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Reviews

Digital drugs (binaural beats): how can it affect the brain/their impact on the brain

Yettou Nour El Houda Baakek & Sidi Mohammed El Amine Debbal  

Pages 546-551 | Received 25 Nov 2020, Accepted 24 May 2021, Published online: 29 Jun 2021

 [Download citation](#)

 <https://doi.org/10.1080/03091902.2021.1936236>

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American Journal of Clinical Hypnosis >

Volume 43, 2000 - Issue 1

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Original Articles

Binaural-Beat Induced Theta EEG Activity and Hypnotic Susceptibility

Brian Brady & Larry Stevens

Pages 53-69 | Published online: 31 Sep 2011

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