



MUSICALITY

DANAE DIAZ WONG & RICHARD WONG

AGENDA

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OBJECTIVES

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JIGSAW

04

DEMOS- PITCH & RHYTHM

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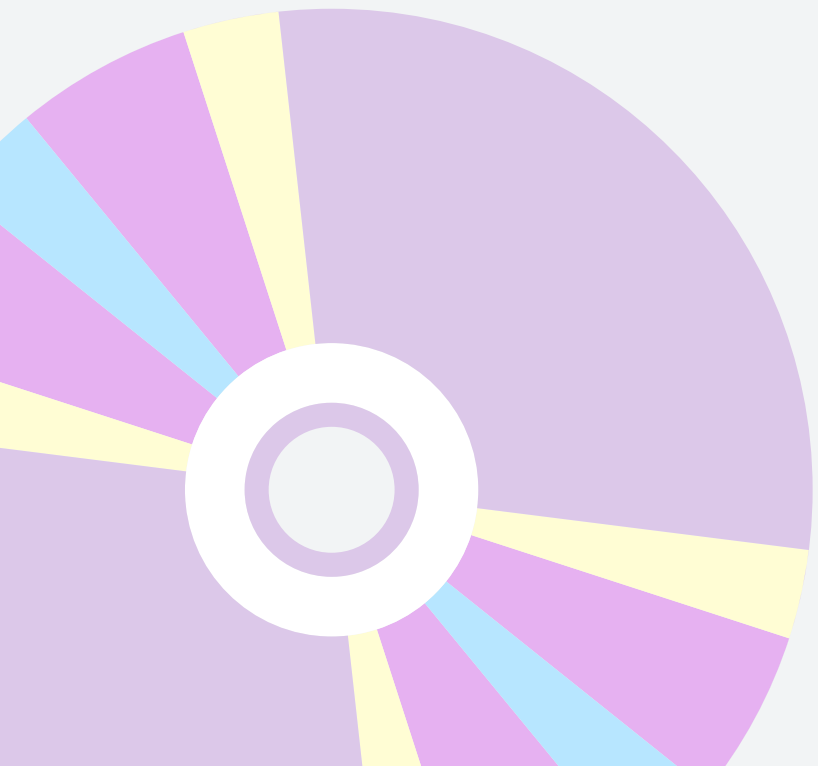
PAPER DISCUSSION

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DATA ANALYSIS

07

WRAP-UP





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Define, describe, and measure rhythm and pitch



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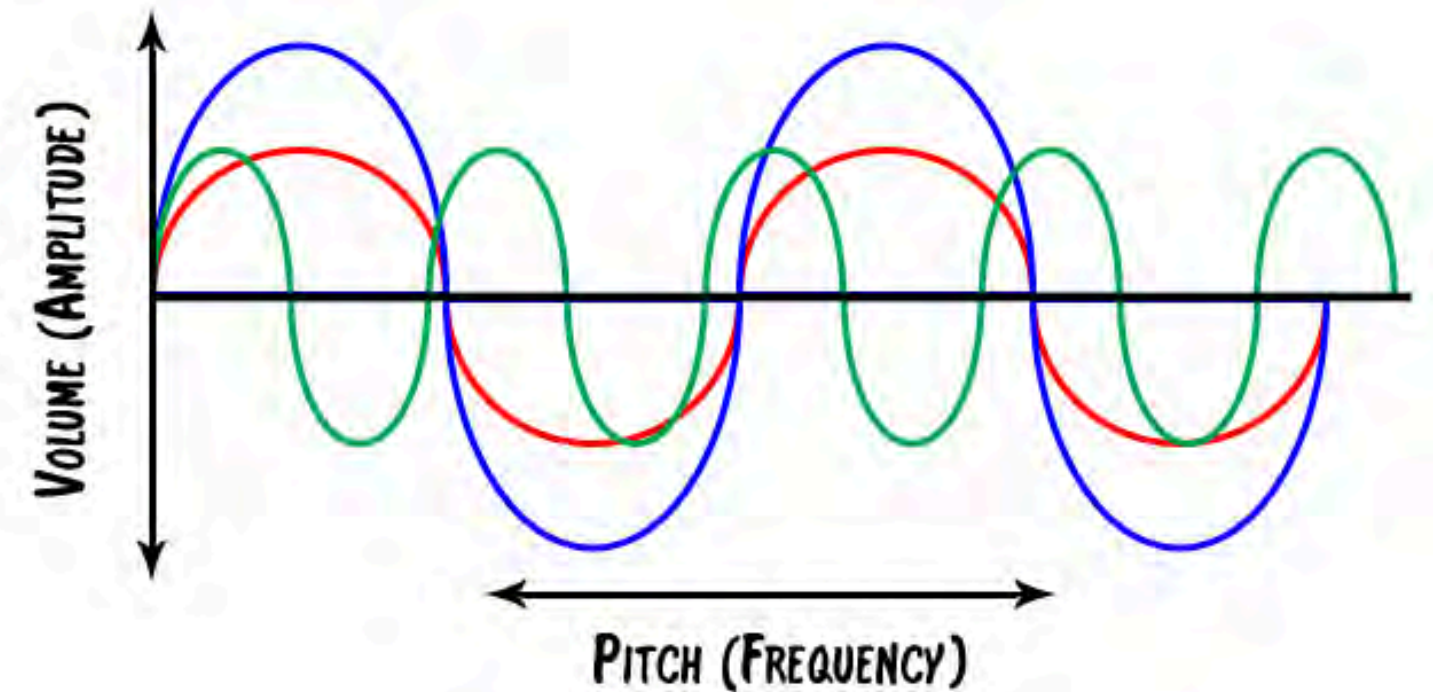
Interpret statistical outputs, and draw evidence-based conclusions that accurately reflect the results

PITCH

The quality that makes it possible to judge sounds as "higher" and "lower" in the sense associated with musical melodies

PITCH

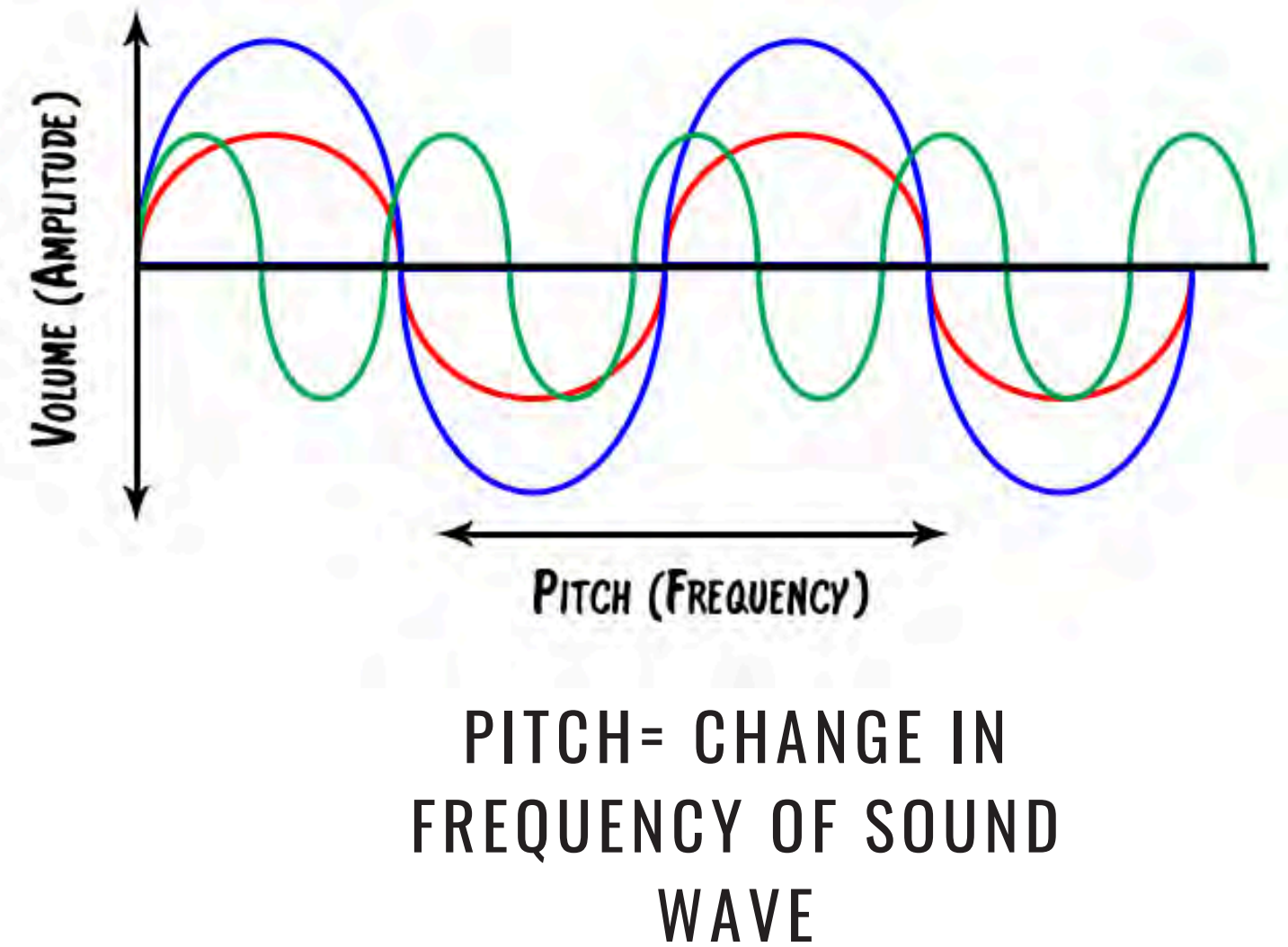
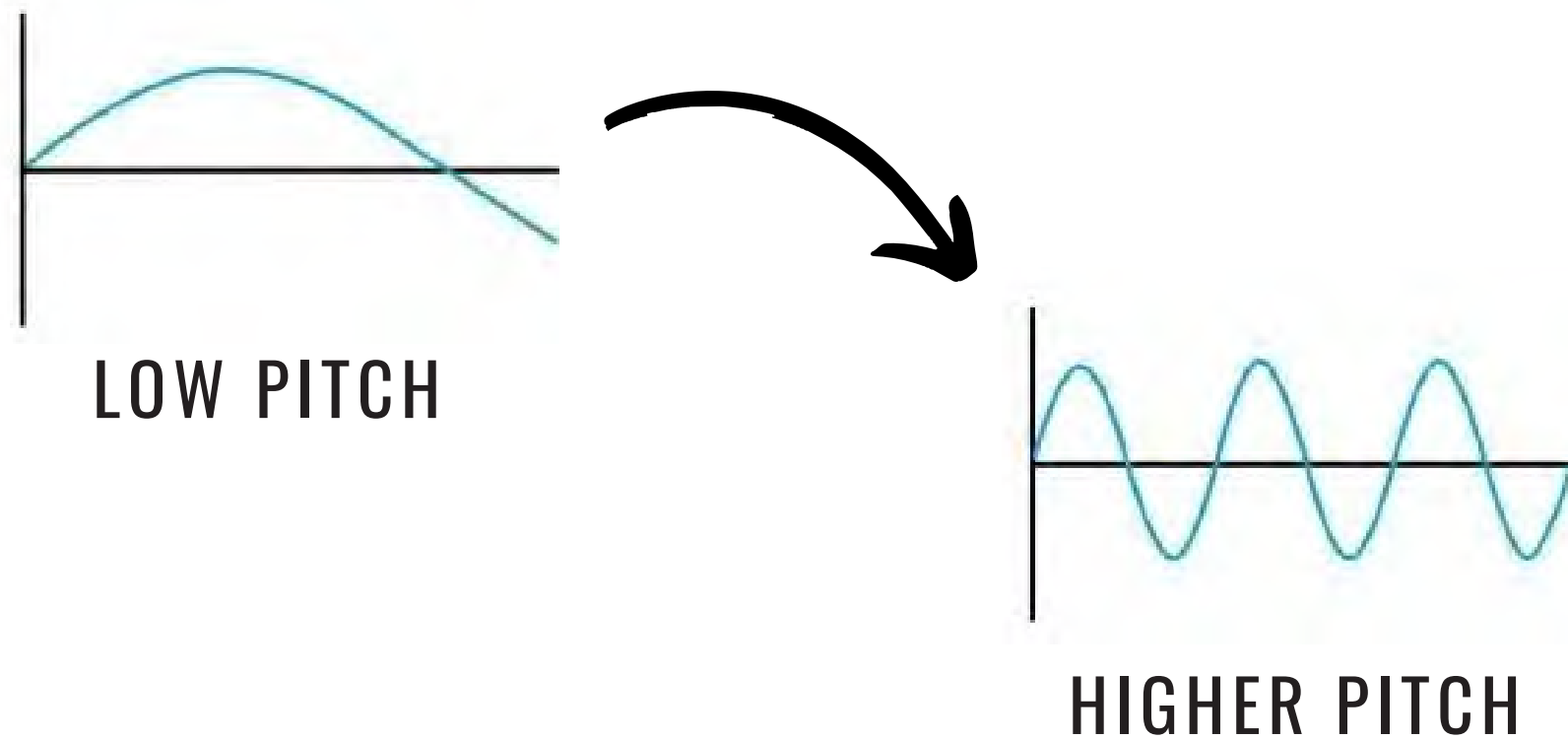
The quality that makes it possible to judge sounds as "higher" and "lower" in the sense associated with musical melodies



PITCH= CHANGE IN
FREQUENCY OF SOUND
WAVE

PITCH

The quality that makes it possible to judge sounds as "higher" and "lower" in the sense associated with musical melodies



RHYTHM

Placement of sounds in time



RHYTHM

Placement of sounds in time

Regular repeated patterns

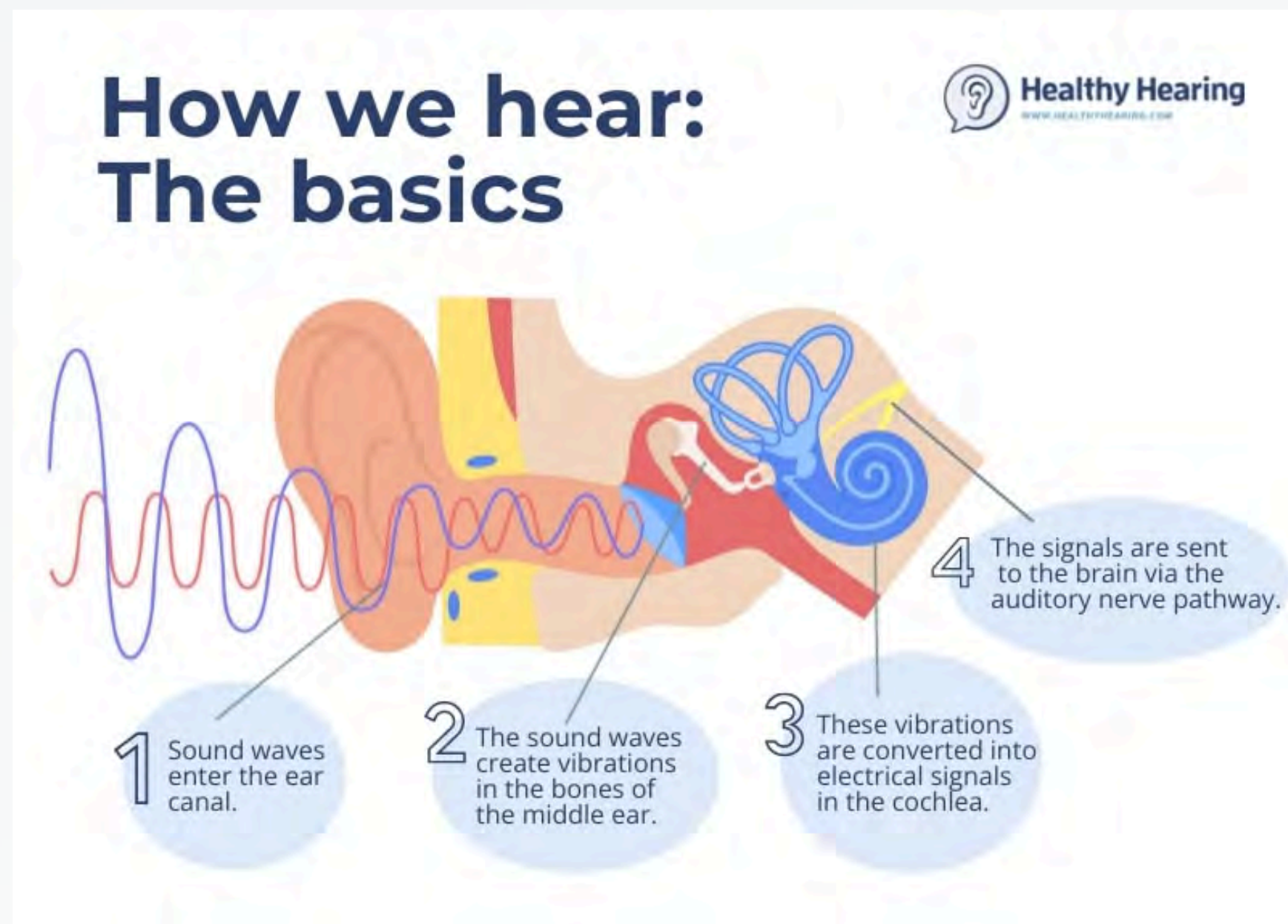


RELATIONSHIP BETWEEN RHYTHM AND PITCH



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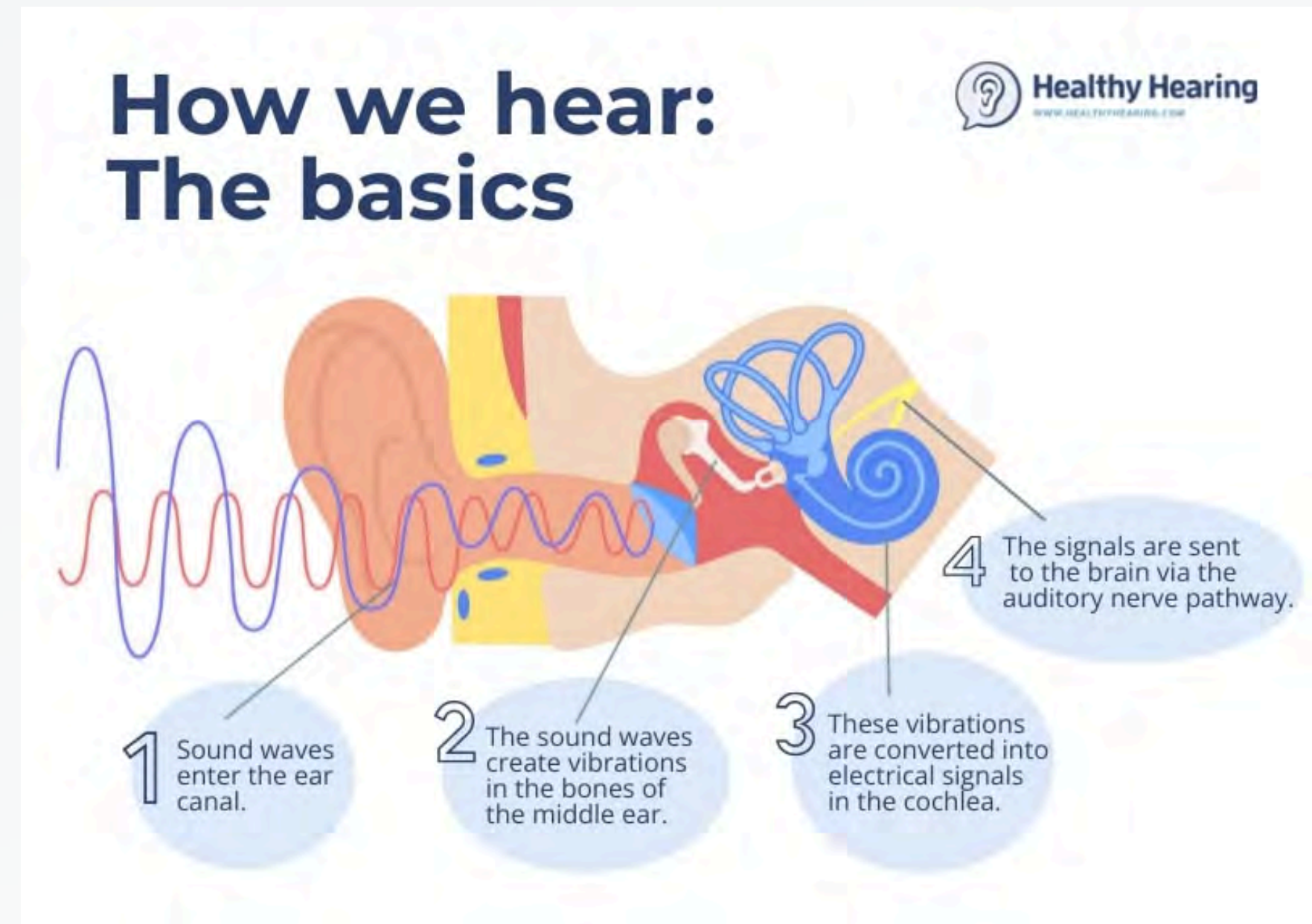
For slow things, our consciousness distinguishes individual events and interprets them as what we call "rhythm."



RELATIONSHIP BETWEEN RHYTHM AND PITCH

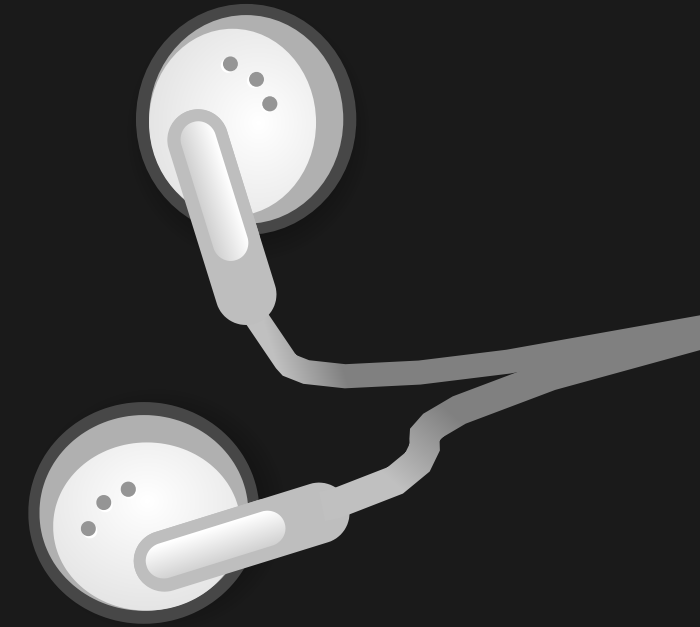
For slow things, our consciousness distinguishes individual events and interprets them as what we call "rhythm."

For very fast things, our consciousness isn't fast enough to distinguish the individual events, and our pitch hearing kicks in.





DEMO



Pitch Test



Distorted Tunes Test

- <http://www.nidcd.nih.gov/>
- You will hear a series of tunes and be asked whether the tune was played correctly yes or no.
- You will receive a score at the end

Got rhythm?

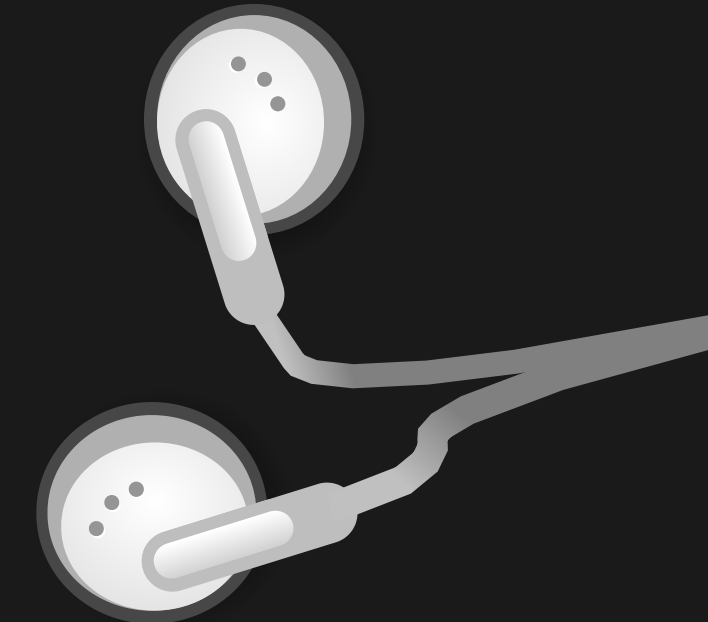
- <https://www.concerthotels.com/got-rhythm>
- You will be asked to tap your space key to the beat of the rhythm and given a score.
- Take the test three times and write each score on board under trial 1, trial 2, and trial 3.

Rhythm Test





DEMO



Record Data



- Please record scores onto the Google Sheet
- In the Experience column, have you had previous musical experience (1) or no (0)

DISCUSSION GROUPS

Group 1

- Sayuri Bhatia
- Gabriel Bostick
- Kaitlyn Bumpers
- Charlotte Caddell
- Carolyn Chen
- Julia Saunicheva
- Vinith Upadhya
- Tessa Nyhan

Group 2

- Sion Cheng
- Abhay Cheruku
- Sierra Dunlap
- Esosa Ediea
- Melanie Espenoza-Carmona
- Garret Smith
- Kinsey Allen

Group 3

- Husna Khan
- Olivia Kim
- Frank Lin
- Avi Murlikrishnan
- Karen Ni
- Ryan Stretch
- Isadora Mamikunian

Group 4

- Wyatt Nowacek
- Diya Patel
- Emma Podol
- Yurika Sakai
- Ayssa Sanchez
- Sara Torrez
- Aditya Raj

GROUP 1

Animal Cognition (2024) 27:38
<https://doi.org/10.1007/s10071-024-01875-5>

ORIGINAL PAPER

In "Tone" with dogs: exploring canine musicality

Claudia Pinelli¹ · Anna Scandurra² · Cristina Giacomini³ · Alfredo Di Lucrezia² · Biagio D'Aniello²

GROUP 2

Article

Current Biology

Language experience predicts music processing in a half-million speakers of fifty-four languages

Highlights

- We tested music perception ability in a massive global sample covering many languages

Authors

Jingxuan Liu, Courtney B. Hilton, Erika Bergelson, Samuel A. Mehr

GROUP 3

Behavioral Ecology
doi:10.1093/beheco/arn065
Advance Access publication 17 June 2008

The ecology of vocal signaling: male spacing and communication distance of different song traits in nightingales

Marc Naguib,^{a,b} Rouven Schmidt,^{b,c} Philipp Sprau,^{a,b} Tobias Roth,^{d,e} Cornelia Flörcke,^b and Valentin Amrhein^{d,e}

^aNetherlands Institute of Ecology (NIOO-KNAW), Department of Population Biology, Heteren, The Netherlands

GROUP 4

Skill acquisition in music performance: relations between planning and temporal control

Carolyn Drake^{a,*}, Caroline Palmer^b

^aCMPS, ^bUniversity of Bath, Bath, England

DISCUSSION

What is the overarching goal of the paper?

What did they do to try and answer this question (methods)

What are the results? What claims did they make?

What conclusions can actually be drawn from the work?

What, if anything, would you do differently?

If you were to do a follow-up study, what would it be?

MUSICALLITY- SENSORY BIOLOGY

Drake and Palmer 2000: How does this study show that practicing music changes the way the brain connects hearing and movement?

Liu et al. 2023 What does this study suggest about how learning a language changes the way our auditory system processes sounds?

Naguib et al. 2008: How does the environment influence how animals produce sounds and how others hear them?

Pinelli et al. 2023: What does this study tell us about how dogs hear and interpret human tone of voice?

The image shows a screenshot of an Excel spreadsheet. The formula bar at the top displays 'D3' and 'NA'. The spreadsheet has columns labeled A through F and rows numbered 1 through 5. The data is as follows:

	A	B	C	D	E	F
1	Name	Attempt	Rhythm	Pitch	Experience	Ratio
2		1	791	25		1 31.426666667
3		2	769	NA	NA	NA
4		3	797	NA	NA	NA

**WHAT RESEARCH QUESTIONS
CAN WE ASK WITH THE DATA
FROM THESE DEMOS?**

CREATE HYPOTHESIS AND PREDICTIONS FOR FOLLOWING RESEARCH QUESTIONS:

Can practice
improve rhythm?

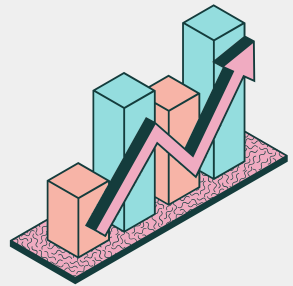
Does experience
improve
pitch/rhythm

Relationship
between rhythm
and pitch?

DATA EXPEDITION



What are our hypotheses?



Analyze Data Using R



Create three graphs

- Can practice improve rhythm?
- Does experience improve pitch/rhythm?
- Relationship between rhythm and pitch?

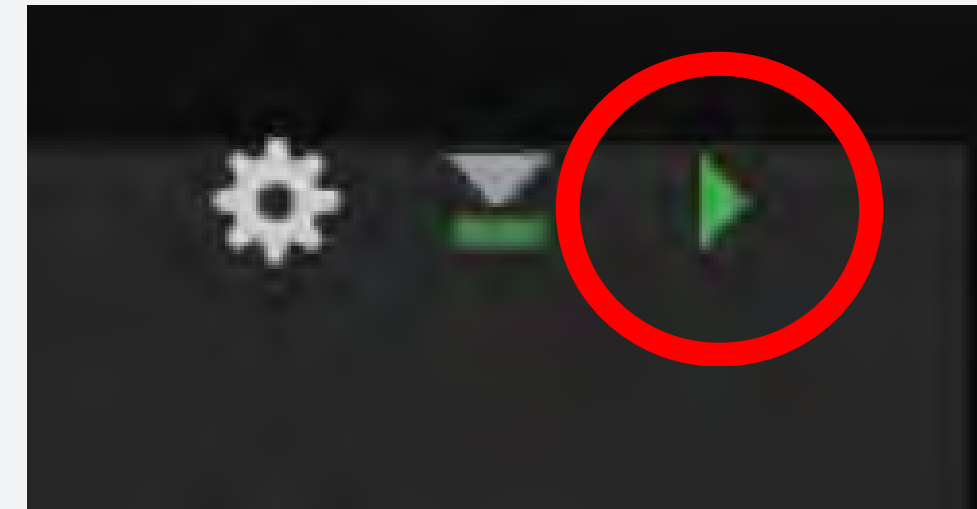


Submit to Dr. Johnsen & dmd76@duke.edu

- Three Graphs
- Each graph will have a few results statements relating to the figure

DATA EXPEDITION

1. Input your demo scores to the google sheets
2. Download R file
3. Download the data sheet as a .csv
4. Set Working Directory
5. Run code chunks



```
Call:
glm(formula = Rhythm ~ Attempt, data = Data)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-521.24  -16.91   44.76   79.95  176.76

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  809.3519   56.9726  14.200  <2e-16 ***
Attempt      -0.5556   26.3732  -0.021  0.983
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for gaussian family taken to be 25039.59)

    Null deviance: 1302070  on 53  degrees of freedom
Residual deviance: 1302059  on 52  degrees of freedom
AIC: 704.13

Number of Fisher Scoring iterations: 2
```


MUSICALITY IN PRACTICE

How do Drake and Palmer's findings on timing and coordination in music performance inform our understanding of sensory-motor integration, particularly the role of auditory feedback in shaping neural mechanisms of temporal precision during skill acquisition?

What do Liu et al. (2023)'s findings suggest about how language experience shapes the fundamental biology of sensory systems, particularly in terms of experience-dependent plasticity and early auditory encoding of speech?

What does Naguib et al. (2008) suggest about how ecological pressures shape the sensory biology of vocal communication systems, particularly in terms of how signal structure and receiver auditory sensitivity co-evolve in different environments?

What do Pinelli et al.'s findings suggest about how domestic dogs process human vocal tone at a sensory level, and how might experience with humans shape the neural and perceptual mechanisms underlying cross-species auditory communication?