

UNIVERSITY OF BOLTON

SCHOOL OF SPORT AND BIOLOGICAL SCIENCES

BSC (HONS) BIOLOGY

SEMESTER TWO EXAMINATION 2018/2019

SENSORY PHYSIOLOGY

MODULE NO: BIO6005

Date: Wednesday 22 May 2019

Time: 10.00 am – 1.00 pm

INSTRUCTIONS TO CANDIDATES:

Candidates are advised that the examiners attach importance to legibility of writing and clarity of expression. **YOU ARE STRONGLY ADVISED TO PLAN YOUR ANSWERS.**

There are **FIVE** questions on this paper.

There are **TWO** sections.

Answer **THREE** questions.
Answer the section A question and **TWO** questions from section B.
Answer all parts of the question.

All questions carry equal marks.
This examination paper carries a total of 150 marks.

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PAST EXAMINATION PAPER

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Section A. You must answer this question.

1. You designed and conducted an experiment to test the null hypotheses that, at $P=0.05$ or less:
 - i. 'Listening to a range of different musical genres has no significant effect on the heart rate (beats per minute) of university students.'
 - ii. 'Listening to a range of different musical genres has no significant effect on the reported emotional responses of university students.'
- a) Making reference to figure 1 and tables 1 to 5, interpret the outcomes of your experiment. Your answer should include justification of the choice of the statistical techniques used and your decisions about rejection of the hypothesis.
- b) Using your knowledge of cochlear function and mapping of the auditory cortex, suggest the possible reasons for the results of your experiment.

(35 marks)

(15 marks)

Total [50 marks]

PLEASE TURN THE PAGE FOR FIGURES AND TABLES FOR QUESTION ONE

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Section A.
FIGURES AND TABLES FOR QUESTION ONE

Table 1. Names and characteristics of experimental pieces of music.

Piece of music	Genre	Key	Tempo	Chord sequence	Melodic
Heart of Glass Original	Disco	Major	Fast	Predictable	Yes
Heart of Glass Crabtree Mix	Instrumental	Minor	Slow	Predictable	Yes
Einstein on the Beach	Modern Opera	Major	Moderate	Unpredictable	No
Bab' Aziz	Instrumental	Minor	Slow	Predictable	Yes
Stockhausen Ausgang	Atonal	Not defined	Unpredictable	Unpredictable	No
Scott McKenzie: San Francisco	Folk	Major	Moderate	Predictable	Yes
Lian Ross Fantasy	High Energy	Major	Fast	Predictable	Yes

Table 2. One Way Analysis of Variance of the effect of music type on heart rate (BPM).

	Sum of Squares	df	Mean Square	F	P Value
Between Groups	1503.609	7	214.801	6.096	0.000
Within Groups	1973.125	56	35.234		
Total	3476.734	63			

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Section A.
FIGURES AND TABLES FOR QUESTION ONE CONTINUED

Table 3. Tukey multiple comparison test of the effect of music type on heart rate (BPM).

Piece of music	Multiple comparison	P Value
Baseline	Heart of Glass Original	0.858
	Heart of Glass Crabtree	0.996
	Einstein on the Beach	0.02
	Bab' Aziz	0.588
	Stockhausen Ausgang	0.282
	Scott McKenzie: San Francisco	1
	Lian Ross Fantasy	0.964
Heart of Glass Original	Einstein on the Beach	0.424
	Bab' Aziz	0.039
	Scott McKenzie: San Francisco	0.643
Heart of Glass Crabtree	Heart of Glass Original	0.424
	Einstein on the Beach	0.002
	Scott McKenzie: San Francisco	1
	Lian Ross Fantasy	0.643
Einstein on the Beach	Bab' Aziz	0
	Stockhausen Ausgang	0.946
	Scott McKenzie: San Francisco	0.006
	Lian Ross Fantasy	0.242
Bab' Aziz	Heart of Glass Crabtree	0.946
	Stockhausen Ausgang	0.002
	Scott McKenzie: San Francisco	0.818
	Lian Ross Fantasy	0.091
Stockhausen Ausgang	Heart of Glass Original	0.977
	Heart of Glass Crabtree	0.06
	Scott McKenzie: San Francisco	0.133
	Lian Ross Fantasy	0.893
Scott McKenzie: San Francisco	Heart of Glass Crabtree	1
	Lian Ross Fantasy	0.838
Lian Ross Fantasy	Heart of Glass Original	1
	Bab' Aziz	0.091
	Stockhausen Ausgang	0.893

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Section A.
FIGURES AND TABLES FOR QUESTION ONE CONTINUED

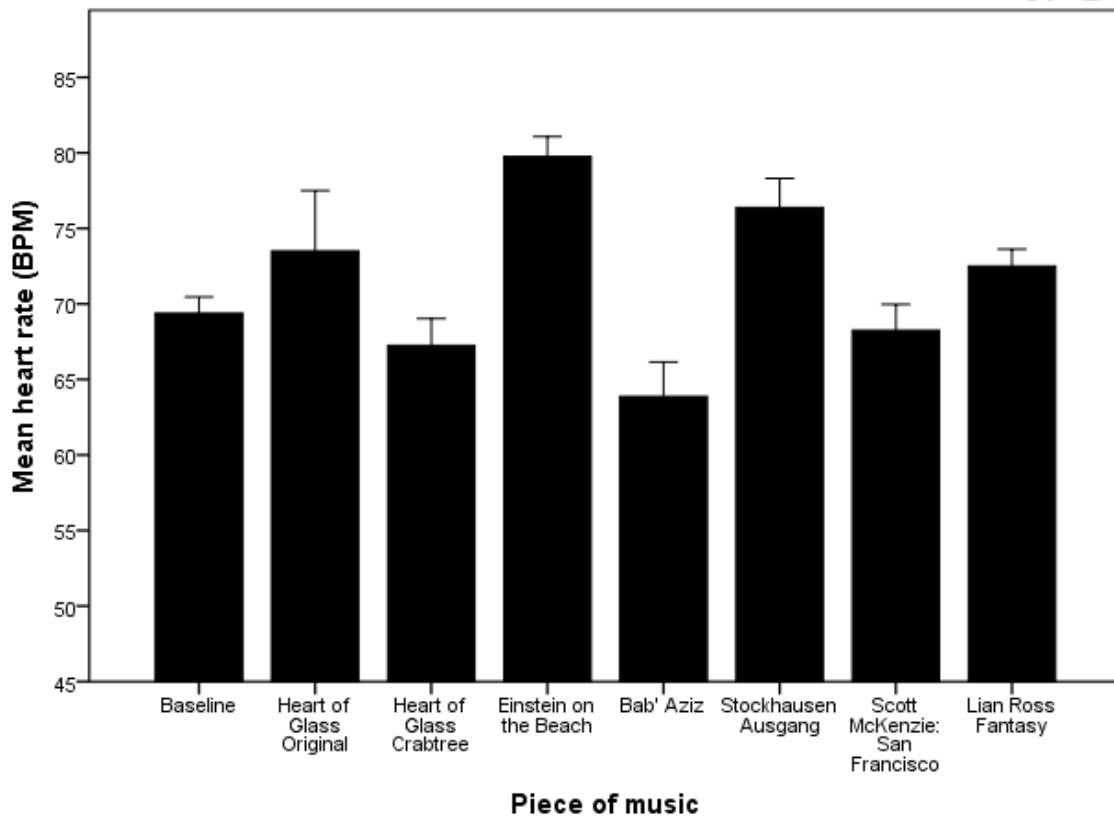


Figure 1. The effect of music on the heart rate of University students. Means and standard errors are shown, n=8.

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Section A.
FIGURES AND TABLES FOR QUESTION ONE CONTINUED

Table 4. Kruskal-Wallis comparison of reported emotional responses to pieces of music played.

Df	Test statistic	P Value
7	36.163	<0.001

Table 5. Frequency of reported emotional responses to pieces of music played.

Piece of Music	Emotional Response	Frequency of Response
Heart of Glass Original	Happy	1
	Amused	1
	Relaxed	2
	Energised	4
Heart of Glass Crabtree	Relaxed	3
	Sad	5
Einstein on the Beach	Amused	2
	Irritated	6
Bab' Aziz	Relaxed	3
	Sad	5
Stockhausen Ausgang	Irritated	8
Scott McKenzie: San Francisco	Happy	6
	Relaxed	2
Lian Ross Fantasy	Happy	3
	Energised	5

End of Section A.

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Section B.

**Answer TWO questions.
Answer all parts of the question.
Illustrate your answers with annotated diagrams.**

2. Critically appraise the often-conflicting scientific evidence that seeks to explain how animals navigate during their migrations. Use case studies to support your answer.

[50 marks]

3. Compare and contrast the mechanisms and functions of echolocation in bats and toothed whales.

[50 marks]

4. Analyse the mechanisms by which the proprioceptive, vestibular, and visual systems integrate sensory input to maintain balance, body position, and control of movement.

[50 marks]

5. Critically evaluate how the structures of the human visual system relate to their functions in light transmission and image formation.

[50 marks]

END OF QUESTIONS