Measuring the Facets of Musicality: The Goldsmiths Musical Sophistication Index

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What is the Gold-MSI?

- A new self-report inventory
- A new battery of musical tests
- A lot of data
- A novel concept
The Concept

Motivation:

• No standardised questionnaire instrument to assess skilled musical behaviours
• Over-reliance on formal (classical?) music training as proxy for musical abilities and understanding
• Recognising multiple facets of musical expertise
• Joining self-report questionnaire and ability tests into one research tool and make it freely available
A New Definition

- **Musical Sophistication:**
  - Psychometric construct comprising musical skills, expertise, achievements and related behaviours across a range of facets measured on different subscales.

- **Assumptions:**
  - Facets of musical sophistication can develop through active engagement with music in its many different forms.
  - Individuals vary in their level of sophistication on the different facets.
  - High levels of musical sophistication are generally characterised by
    - higher frequencies for exerting the musical skills or behaviours
    - greater ease, accuracy or effect of the musical behaviour when executed,
    - a greater and more varied repertoire of behaviour patterns associated with it.
Really a New Concept?

- **Self-report questionnaires:**

- **Musical ability tests:**
  Seashore, Lewis, & Saetveit (1960), Wing (1962), Bentley (1966), Gordon (1989), Wallentin et al. (2010)

- **Conceptual suggestions:**

**Missing:**
(Focus on musical expertise) x (Covering wide range of skills) x (Combining self-report and objective testing)
Components of the Gold-MSI v1.0

- 38-item Self-report Inventory covering 5 different facets of musical expertise
- 13-item Melodic Memory test:
  - AB comparison
  - novel folk tunes
- 17-item Beat Perception test:
  - correct/incorrect judgement
  - unknown instrumental tunes from rock, jazz, popular classical
  - variant of Iversen & Patel’s (2008) Beat Alignment Test
- 16-item Sound Similarity test:
  - 800ms audio excerpts from typical rock, pop, hiphop, jazz songs
  - Sorting paradigm similar to Gingras et al. (2011)
- (Beat Production test)
A Lot of Data

- Pilot study self-report inventory with BBC LabUK (n=488)

- **BBC LabUK online implementation** How Musical Are You? (n~148,000)

- 5 extended lab studies for optimisation of listening tests (together: n~600)

- 2 Questionnaire studies for external validity of self-report inventory (n=214, n=144)

- Online implementation for Channel 4’s Hidden Talent Show (n= 3,793)

- Lab study testing reliability and correlation with cognitive abilities (n=51)
The Dimensions of Musical Sophistication

- Data: 147,633 participants responding to 70 question items;
- Analysis goals:
  1. Identify latent factor structure and ‘cluster’ items into subscales
  2. Refine and shorten subscales
- Techniques: Factor analysis, item response models, structural equation modelling
Result 1: There is a strong general factor of musical sophistication

- Evidence: High eigenvalue of 1st factor, high inter-factor correlations, high $\omega_{\text{hierarchical}}$

Result 2: There are 5 distinct dimensions of musical sophistication. They can be measured by 6-9 items each

- Evidence: Good model fit of SEM: AGF: .84, RMSEA: .06
- Evidence: High internal reliabilities of subscales ($\alpha > .79$)
## Reliability and Validity

<table>
<thead>
<tr>
<th></th>
<th>Test-Retest Reliability: Correlations (n=53, mean time lag= 64 days)</th>
<th>External Validity: Correlations with relevant dimension from MEQ (Werner et al., 2006, n=141)</th>
<th>External Validity: Correlations with Gordon’s AMMA (n=44)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Engagement</td>
<td>.90**</td>
<td>.20*</td>
<td>.41**</td>
</tr>
<tr>
<td>Perceptual Abilities</td>
<td>.89**</td>
<td>.32**</td>
<td>.51**</td>
</tr>
<tr>
<td>Musical Training</td>
<td>.97**</td>
<td>.40**</td>
<td>.43**</td>
</tr>
<tr>
<td>Singing Abilities</td>
<td>.94**</td>
<td>.42**</td>
<td>.43**</td>
</tr>
<tr>
<td>Emotions</td>
<td>.86**</td>
<td>.19*</td>
<td>.32*</td>
</tr>
<tr>
<td>General Musical Sophistication</td>
<td>.97**</td>
<td>.45**</td>
<td>.50**</td>
</tr>
</tbody>
</table>
Interim summary

- Gold MSI self-report inventory is a valid and reliable measure of different facets of musical sophistication.
- It comprises 5 factors and 1 general factor.
- It is based on self-assessed skills and self-reported behaviours.

⇒ How does self-reported sophistication compare to performance in listening tests?
• Result 1: Musical Training benefits melodic memory and beat perception performance
  • Evidence: $\beta = .22$ and $.17$

• Result 2: Active (listening) Engagement (but not Musical Training) benefits sound similarity judgements
  • Evidence: $\beta = .11$ and $.03$
Result 3: General Musical Sophistication indexes all three test scores best
  • Evidence: $\beta = .27, .29$ and .13

Result 4: The three listening tests measure different abilities
  • Evidence: Low inter-test correlations ($< .15$)
Where does musical sophistication come from?

What are socio-economic conditions for a sophisticated relationship with music?
Conditions of Musical Sophistication

How does self-reported musical sophistication relate to socio-economic variables?

- Data: 90,474 Brits from How Musical Are You? sample
- Analysis:
  - Identify most important socio-economic variables from random forest regression model
  - Post-hoc analysis based on permutation tests
**SES Affecting Self-reported General Musical Sophistication**

- Occupation: ‘Creative’ (media, music) and educational professions
- Age: Younger people
- Occupational status: People in education
- Occupational Status: retired People
- Education: (Only) A-Levels

But: Socio-economic variables account only for small proportion (4.5%) of variance in General Musical Sophistication
Conditions of Musical Sophistication 2

How do test scores relate to socio-economic variables and musical training?

- Data: 90,474 Brits from *How Musical Are You?* sample
- Analysis:
  - Identify most important variables from random forest regression model
  - Post-hoc analysis based on permutation tests
SES Affecting Performance on Listening Tests

- Musical Training
- Age
- Occupational Status: Self-employed
- Occupational status: In FT employment

- Only 3% of variance explained by socio-economic variables
- 11% explained when Musical Training included
- Musical Training necessary condition for perfect listening skills?
  ➞ Only 85 Brits with no musical training among 7902 Top10 test takers.
The Role of Wealth

How does wealth of local area affect test scores and self-reported Musical Sophistication?

Data:
- Averages (self-report, test scores) by local authority of ~60,000 Brits from How Musical Are You? Sample
- Median income by local authority from 2011 Annual Survey of Earnings (National Office of Statistics and Ordnance Survey)
## Correlations with Income

<table>
<thead>
<tr>
<th></th>
<th>Weekly Gross Income (n=375)</th>
<th>Annual Gross Income (n=365)</th>
<th>( R^2 ) (Percentage of variance explained)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Engagement</td>
<td>.05</td>
<td>.01</td>
<td>.002</td>
</tr>
<tr>
<td>Perceptual Abilities</td>
<td>.17**</td>
<td>.13*</td>
<td>.028</td>
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<tr>
<td>Musical Training</td>
<td>.34**</td>
<td>.31**</td>
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<td>.14*</td>
<td>.021</td>
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<tr>
<td>Melody Memory</td>
<td>.30**</td>
<td>.29**</td>
<td>.088</td>
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<tr>
<td>Beat Perception</td>
<td>.32**</td>
<td>.34**</td>
<td>.102</td>
</tr>
<tr>
<td>Sound Similarity</td>
<td>.30**</td>
<td>.26**</td>
<td>.09</td>
</tr>
<tr>
<td>Combined test score</td>
<td>.41**</td>
<td>.40**</td>
<td>.171</td>
</tr>
</tbody>
</table>
Correlations with Income

Musical Training ~ Annual Income ($r = .31$)

Active Engagement ~ Annual Income ($r = .01$)
Correlations with Income

General Sophistication ~ Annual Income \((r = .14)\)

Combined test score ~ Annual Income \((r = .40)\)
# Where Britain is most musical

## The Top 5

<table>
<thead>
<tr>
<th>Musical Training</th>
<th>Combined Test score</th>
<th>General Musical Sophistication</th>
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</thead>
<tbody>
<tr>
<td>City of London</td>
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<td>Hastings</td>
</tr>
<tr>
<td>Cambridge</td>
<td>Hackney</td>
<td>West Sommerset</td>
</tr>
<tr>
<td>York</td>
<td>Oxford</td>
<td>North Dorset</td>
</tr>
<tr>
<td>Cherwell</td>
<td>Islington</td>
<td>Bleanau Gwent</td>
</tr>
<tr>
<td>Oxford</td>
<td>Brent</td>
<td>Haringey</td>
</tr>
</tbody>
</table>
‘Musical Landscapes’

UK General Musical Sophistication

UK Combined Testscore from Listening Tests
Musical Training ~ Income

UK Amount Musical Training

UK Weekly Median Income
Summary

- Gold-MSI is valid and reliable self-report inventory and test battery for musical skills and expertise.
- It relates musical behaviours to listening skills
- Occupation and Education have little influence on sophisticated musical behaviour and listening skills
- Income has surprisingly stronger impact (at collective level)

- All components of the Gold-MSI:
  - Are freely available for research purposes
  - Are fully documented
  - Have data norms derived from an adult population

Go to: http://www.gold.ac.uk/music-mind-brain/gold-msi/
... to get Gold-MSI v1.0 of self-report inventory and audio materials
Thank you!

The Gold-MSI Core Team:
- Jason Musil
- Lauren Stewart
- Bruno Gingras

Very helpful people:
- Amit Avron
- Thenille Braun
- Monika Ruscynski
- Naoko Skiada