Supervenience and the Mind-body Problem in Depression

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The authors declare no conflicts of interest associated with this presentation.
Objective

- To deal with the mind-body problem from the viewpoint of 'supervenience theory'
Psychiatry and the Mind-Body Problem

- The mind-body problem in philosophy
- The mind-brain problem in psychiatry
  - Subjective & objective
  - Etiology: brain-based vs mentally-based
  - Therapies: drug vs CBT
The Mind-body Problem in Metabolome Analysis in Depression

*Setoyama et al. (2016)*:

- Five plasma metabolites were associated with the severity of depression and suicidal ideation
  - 3-hydroxybutyrate (3HB)
  - Betaine
  - Citrate
  - Creatinine
  - gamma-aminobutyric acid (GABA)
Philosophical Question:
If this type of research would be advanced...

How do we understand the relationship between the metabolites and mental states?
Quotes Associated with the Mind-body Problem and Their Psychiatric Version

# “The brain secretes thought as the stomach secretes gastric juice, the liver bile, and the kidneys urine.” (Karl Vogt)

# “The dogma of the Ghost in the Machine” (Gilbert Ryle)

# “The brain metabolites secretes depression and suicidal ideation.” (Materialism)

# “Depression and suicidal ideation as ghosts in the metabolites machine” (Behaviorism)
Supervenience
(McLaughlin & Bennett. Stanford Encyclopedia of Philosophy)

- A set of properties $A$ supervenes upon another set of $B$ just in case no two things can differ with respect to $A$-properties without also differing with respect to their $B$-properties.

- “… there cannot be an $A$-difference without a $B$-difference”.
Kim’s Definition

“Mental properties supervene on physical properties, in that necessarily, for any mental property $M$, in anything has $M$ at time $t$, there exists a physical base (or supervenient) property $P$ such that it has $P$ at $t$, and necessarily anything that has $P$ at a time has $M$ at that time.” (Kim J: “Mind in a Physical World”, p.9)
Supervenience (Kim) is...

- A pattern of property covariation between the mental and the physical
- Points to the existence of a dependency relation between the two
- Silent on the nature of the dependence relation that might explain why the mental supervenes on the physical
Supervenience (Kim) is not a type of dependence relation

- Not a relation that can be placed alongside
  - causal dependence,
  - reductive dependence,
  - mereological dependence,
  - dependence grounded in definability or entailment,
  and the like.
Supervenience …

- *States* the mind-body problem
- Not a solution to it.

*(Kim 1998)*
“To make your painting more beautiful, more expressive, or more dramatic, you must do physical work on the painting and thereby alter the physical supervenience base of the aesthetic properties you want to improve. There is no direct way of making your painting more beautiful or less beautiful: you must change it physically if you want to change it aesthetically – there is no other way.”
Music and its Acoustic-physical Base (Ihara’s paraphrase)

- Melody and rhythm supervene on acoustic physical events.
- No difference in melody and rhythm without some difference in acoustic physical phenomena.
- To make your music more beautiful, the acoustic supervenience bases of the musical properties must be altered.
Mental States Supervene on Neurobiological Events (Ihara’s paraphrase)

- To improve mental states, the neurobiological supervenience bases of the mental states must be altered.
- Every time depression worsens or improves, there are changes in neurobiological bases like metabolites.
- Without changes in neurobiological supervenience bases, any mental states cannot alter.
Music and Acoustic-Physics

The Mental and the Biological

# Music is anchored in the physical nature of sound waves.
# There is no free-floating music without physically based bottom.

# A mental process is anchored in the physical nature of objects and events.
# There is no free-floating depression or suicidal ideation without biologically based bottom.
Music and Acoustic-Physics

# The supervenience of music and acoustics states a pattern of property covariation between the musical events and acoustic-physical events.

# The mind-brain supervenience states a pattern of property covariation between the mental and the neurobiological.
A Scale and its Emotional Atmosphere

◆ Major
  ◆ a happy, hopeful and joyful feeling

◆ Minor
  ◆ a depressive, sad and subdued mood

◆ Okinawan
  ◆ unique, clement, subtropical atmosphere.
The major scale

The Okinawan scale
The ratio between the frequencies of all the notes of the major and Okinawan scales

<table>
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<th>Major Scale</th>
<th>Do</th>
<th>Re</th>
<th>Mi</th>
<th>Fa</th>
<th>So</th>
<th>La</th>
<th>Te</th>
<th>Do</th>
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<td>5/4</td>
<td>4/3</td>
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<td>15/8</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Okinawan Scale</th>
<th>Do</th>
<th>Mi</th>
<th>Fa</th>
<th>So</th>
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</table>
The Difference between Presence or Absence of Re and La

The qualia of the major scale

The qualia of Okinawan scale

By excluding Re and La, every piece of music can be arranged into a music piece having an Okinawan atmosphere. This exclusion is a physical acoustical operation.
Music with a scale and its emotional atmosphere
The neurobiological and its mental atmosphere

# A piece of music supervenes on a series of the acoustic physical events.

# The mental supervenes on the neurobiological states of metabolites.
Music with a scale and its emotional atmosphere
The neurobiological and its mental atmosphere

# A piece of music with the major scale $M$ supervenes on a series of the acoustic physical events with Do, Re, Mi, Fa, So, La, Te

# A piece of music with the Okinawan scale $M'$ arranged from $M$ supervenes on a series of the acoustic physical events with Do, Mi, Fa, So, Te

# Severe suicidal ideation would supervene on the neurobiological state $A$ of metabolites.

# Mild suicidal ideation would supervene on the neurobiological state $A'$ of metabolites.
# The difference of musical qualia between $M$ and $M'$ supervenes on the difference between the presence or the absence of Re and La.

# The difference between the presence or the absence of Re and La is physical in nature.

# The difference of mental qualia between severe and mild suicidal ideation would be due to the difference between the neurobiological state of $A$ and that of $A'$.

# The difference between $A$ and $A'$ is neurobiological in nature.
Summary: The music-acoustic supervenience and the mind-body supervenience

# Music supervenes on the acoustic-physical
# A scale in music has its emotional atmosphere
# The difference of emotional atmosphere between the two scales is physical in nature

# The mental supervenes on the neurobiological
# A neurobiological state has its mental state
# The difference of emotional qualia between the two mental states would be due to the difference between the two neurobiological states, that is physical in nature.
Thank you for your attention

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