Does the quality of food affect the personality and cognitive abilities of mice?

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Let's start with the basics

- Cognitive flexibility
- Personality
- Food quality
Cognitive flexibility

- Flexibility is very energy-consuming

- Animals need behavioral and cognitive flexibility to quickly show appropriate changes in behavior in response to changes in their environment

Cognitive flexibility = differences in ability to learn and remember

More flexible individuals will perform better while individuals with less flexibility will be persistent and make more mistakes
Personality

- Individuals with higher levels of cognitive development may display more complex and/or demanding traits

- Personality refers to differences in behavior that remain stable and correlated with each other regardless of time and context

Cognitive abilities and information processing are often associated with differences in personality.
Food quality

- Driving force for changing behavior is the availability and quality of food

**LOW-QUALITY**
- Bolder
- More interest in exploring
- Less flexible

**HIGH-QUALITY**
- Shy
- Less interest in exploring
- More flexible
Mus musculus domesticus

Standard-quality (SQ) food in 5th generation

High-quality (HQ) food in 5th generation

n=21

n=18
What do we expect?

- **SQ diet**
  - Bold
  - Would show less cognitive flexibility

- **HQ diet**
  - Shy
  - Would show more cognitive flexibility
Novel object

Object was reintroduced again after 3 weeks

- Latency
- Number
- Time spent with object
- Repeatability
Problem solving

- Latency to interact
- Number of interaction
- Time of interaction
No diet effect

Results

- Novel object

\[ p = 0.7676 \]

\[ p = 0.8702 \]

\[ p = 0.2305 \]
Results

Novel object

No repeatability in SQ, not significant
Repeatability in HQ

<table>
<thead>
<tr>
<th></th>
<th>SQ</th>
<th>HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>0</td>
<td>0.572</td>
</tr>
<tr>
<td>P [LRT]</td>
<td>1</td>
<td>0.00522</td>
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</tbody>
</table>
Results

Novel object

No difference in both diet, not significant

<table>
<thead>
<tr>
<th></th>
<th>SQ</th>
<th>HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>0.205</td>
<td>0.201</td>
</tr>
<tr>
<td>P [LRT]</td>
<td>0.201</td>
<td>0.229</td>
</tr>
</tbody>
</table>
No repeatability in SQ
Some repeatability in HQ
Both not significant
Results

Problem solving

Difference in latency in Introduction

Difference in latency in Solving

Treatment: 1-SQ, 2-HQ
Results

Problem solving

Difference in time spent examining an object in Introduction

Difference in time spent examining an object in Solving

Treatment: 1-SQ, 2-HQ
Results | Problem solving

Difference in numbers of examinations in Introduction

Difference in numbers of examinations in Solving

Treatment: 1-SQ, 2-HQ
Results

Problem solving

Mice on SQ diet show more cognitive flexibility than those on HQ

\[ p = 0.0176 \]

\[ p = 0.107 \]

\[ p = 0.055 \]
What do we expect?

- Bold
  - Would show less cognitive flexibility

- Shy
  - Would show more cognitive flexibility

SQ diet

HQ diet
What did we get

- SQ diet
  - Same behavior
  - More cognitively flexible

- HQ diet
  - Same behavior
  - Less cognitively flexible
Take home message

- We have shown that **food quality affects cognition** in mice but **not personality**

- Despite our expectations, **mice on the SQ diet were more flexible**, despite being on a less advantageous diet for cognitive flexibility

- Perhaps **behavioural flexibility** in this case was **more advantageous** for our mice on both diets than cognitive flexibility
Thank you for your attention

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