

# Online Appendix

## Modeling Brain Networks via Volumetric Sparse Deep Belief Network (VS-DBN)

### 1 Intrinsic Functional Maps via Deep Belief Nets

#### 1.1 Emotion Task: Maps from Layer 1, Layer 2, Layer 3





## 1.2 Gambling Task: Maps from Layer 1, Layer 2, Layer 3





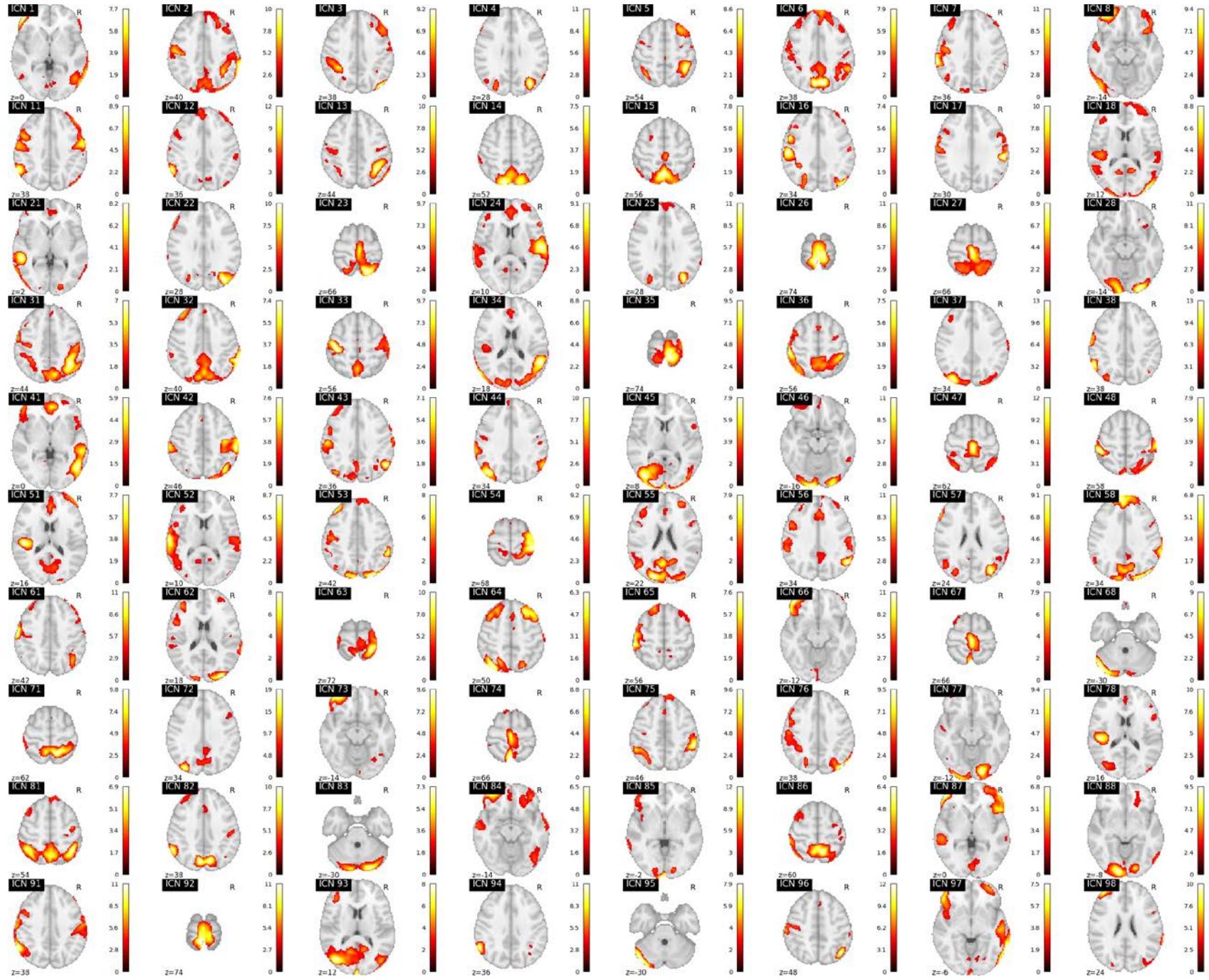
### 1.3 Language Task: Maps from Layer 1, Layer 2, Layer 3





#### 1.4 Motor Task: Maps from Layer 1, Layer 2, Layer 3





1.5 Relational Task: Maps from Layer 1, Layer 2, Layer 3





## 1.6 Social Task: Maps from Layer 1, Layer 2, Layer 3





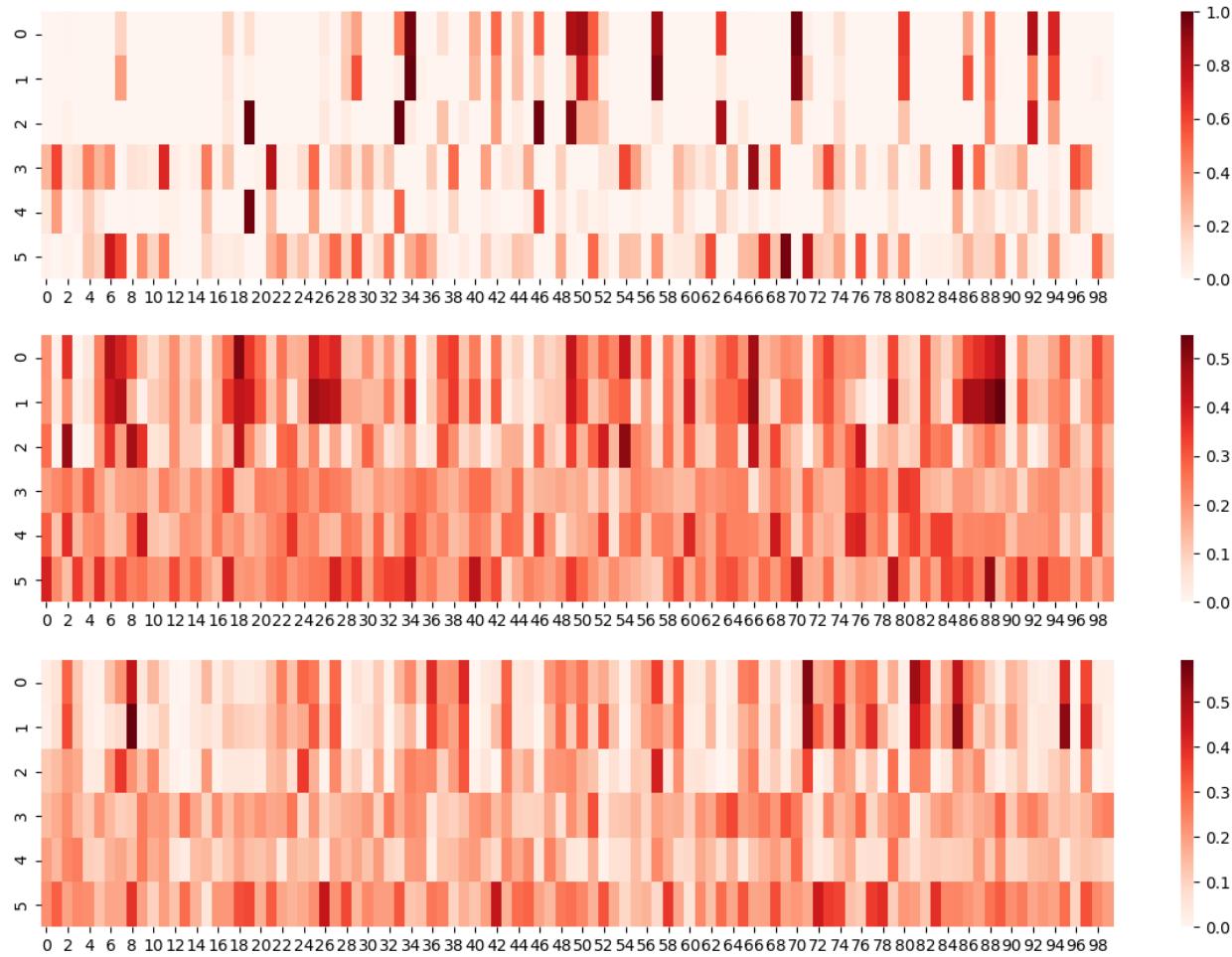
### 1.7 Working Memory Task: Maps from Layer 1, Layer 2, Layer 3



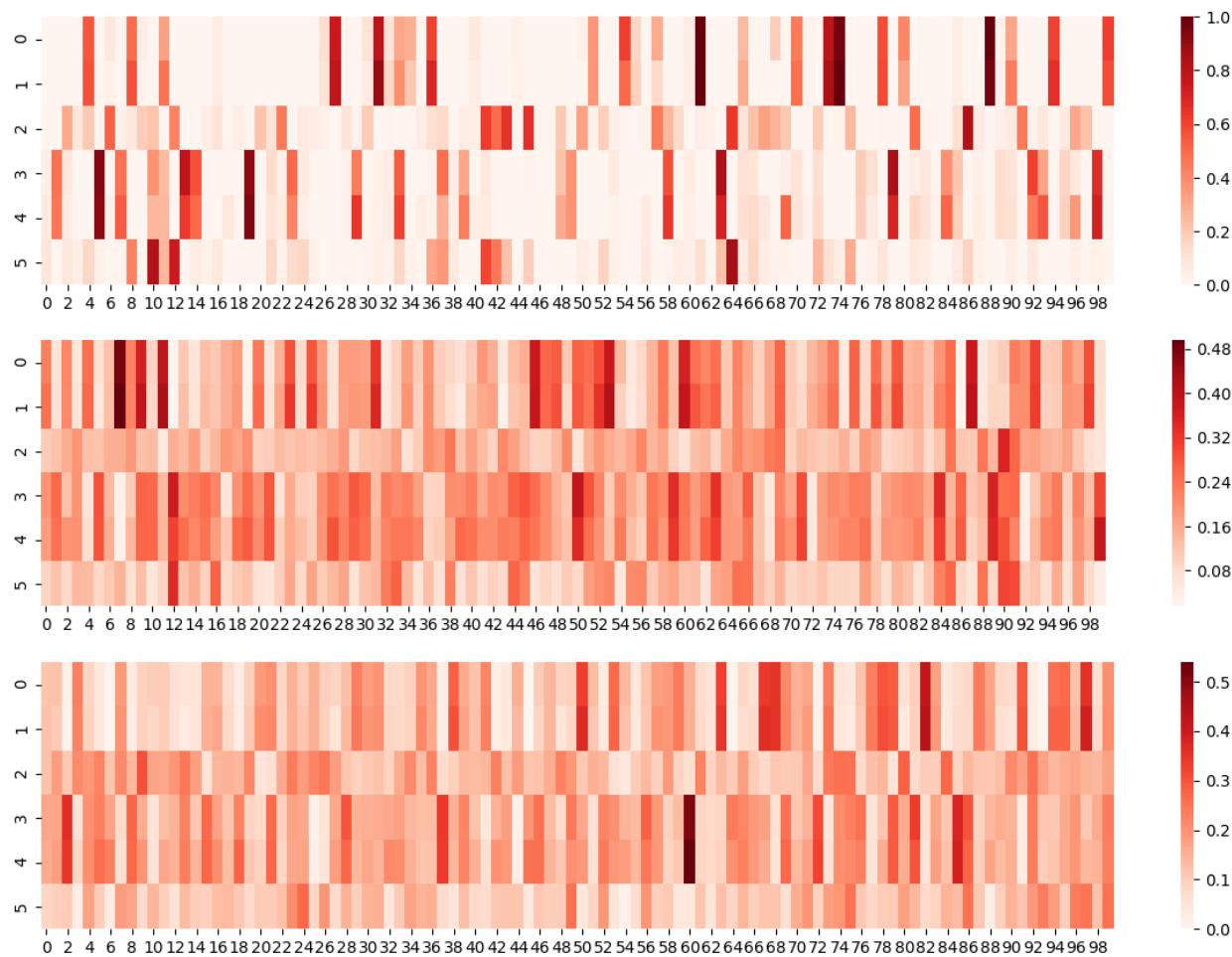


## 2 Comparison with General Linear Model (GLM)

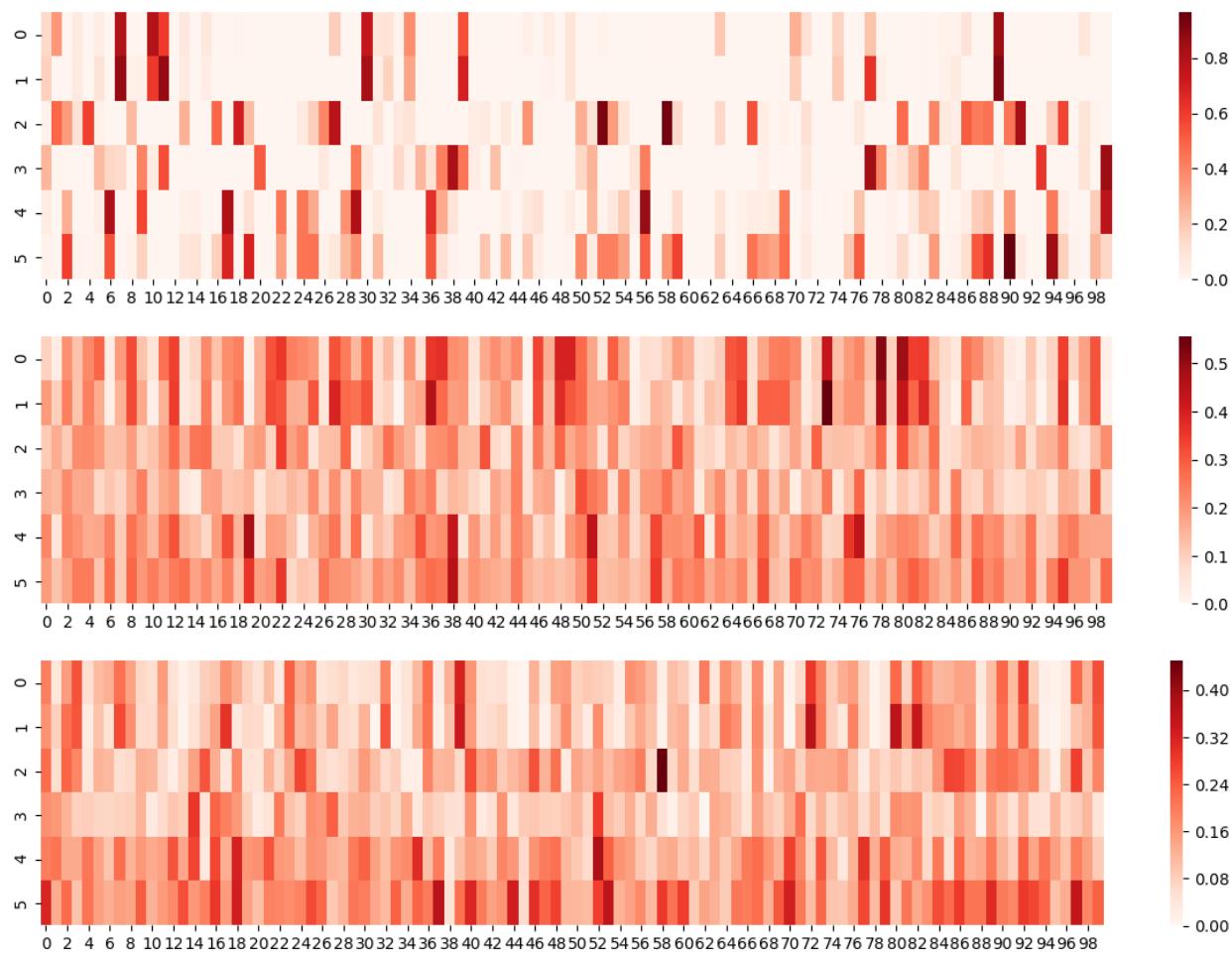
### 2.1 Emotion Task: Overlap between maps from GLM and maps from DBN layer 1, layer 2, layer 3



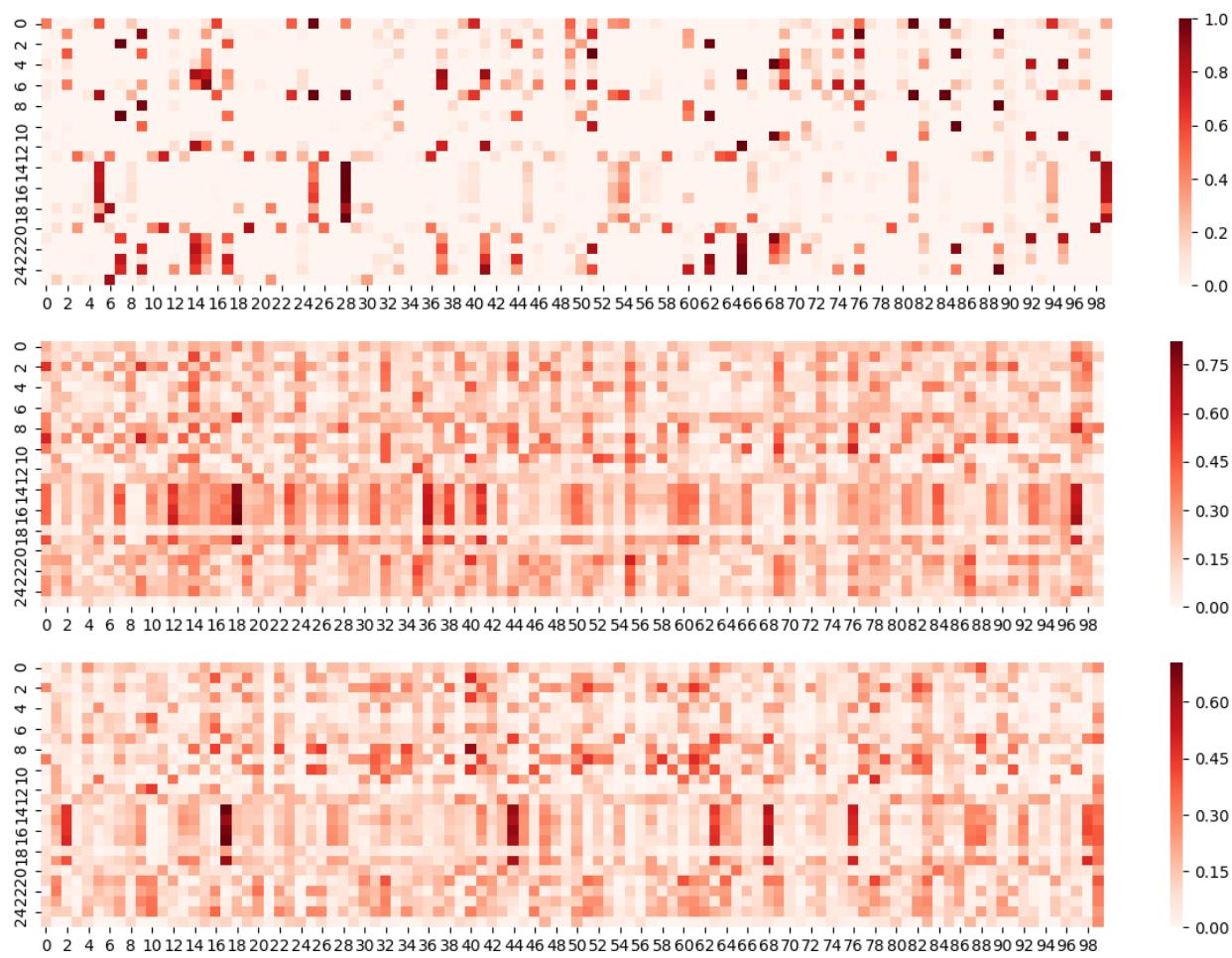
### 2.2 Gambling Task: Overlap between maps from GLM and maps from DBN layer 1, layer 2, layer 3



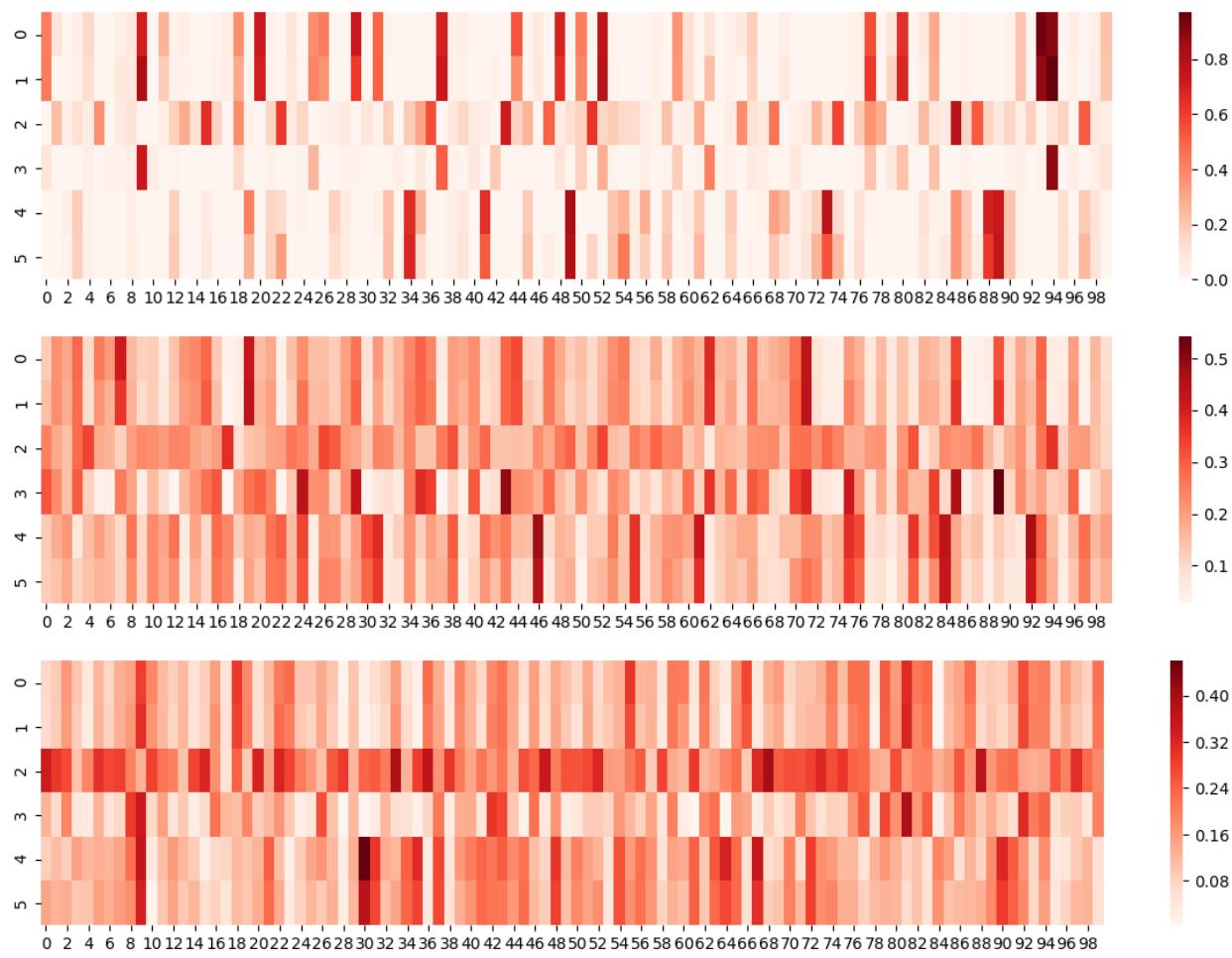
### 2.3 Language Task: Overlap between maps from GLM and maps from DBN layer 1, layer 2, layer 3



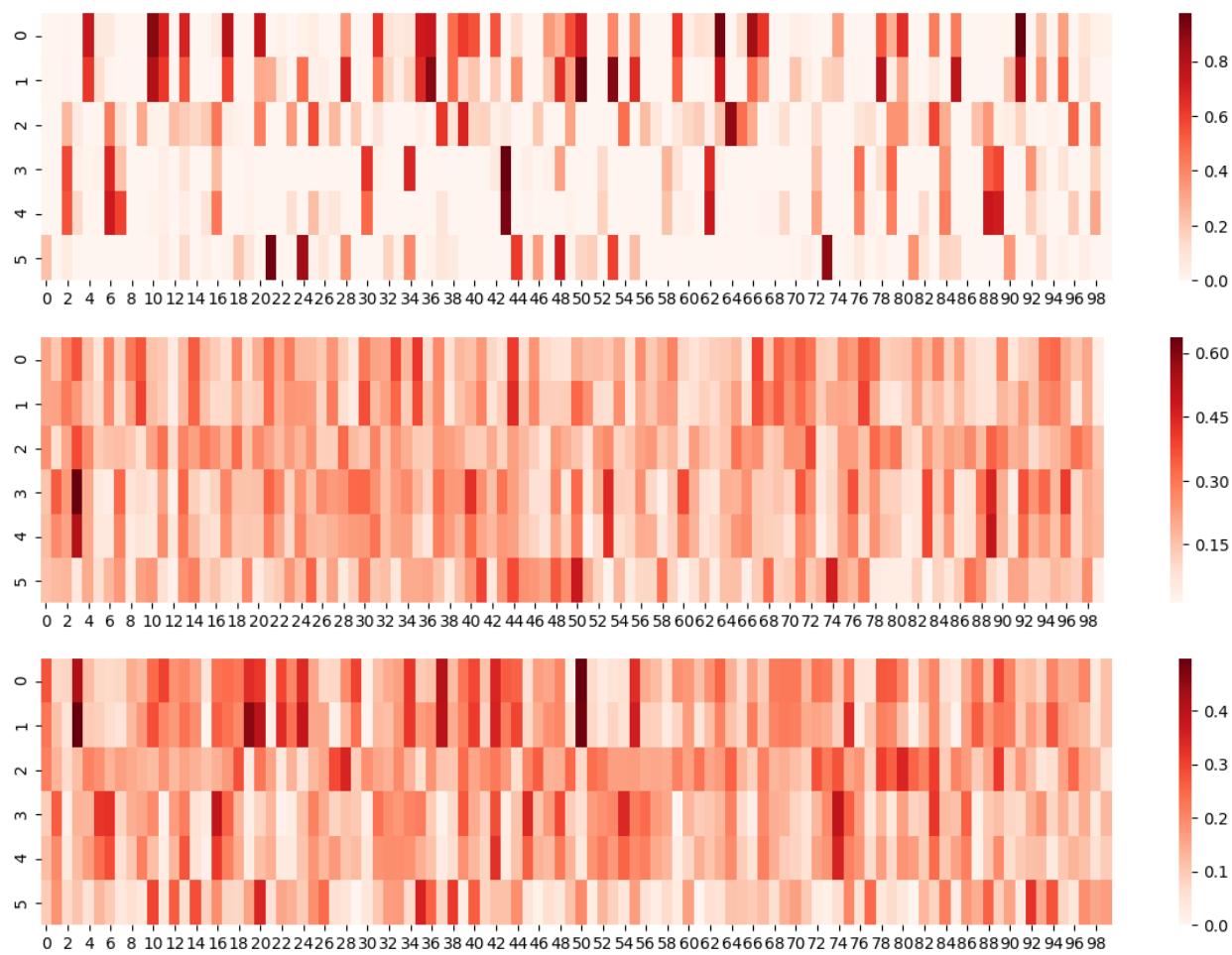
### 2.4 Motor Task: Overlap between maps from GLM and maps from DBN layer 1, layer 2, layer 3



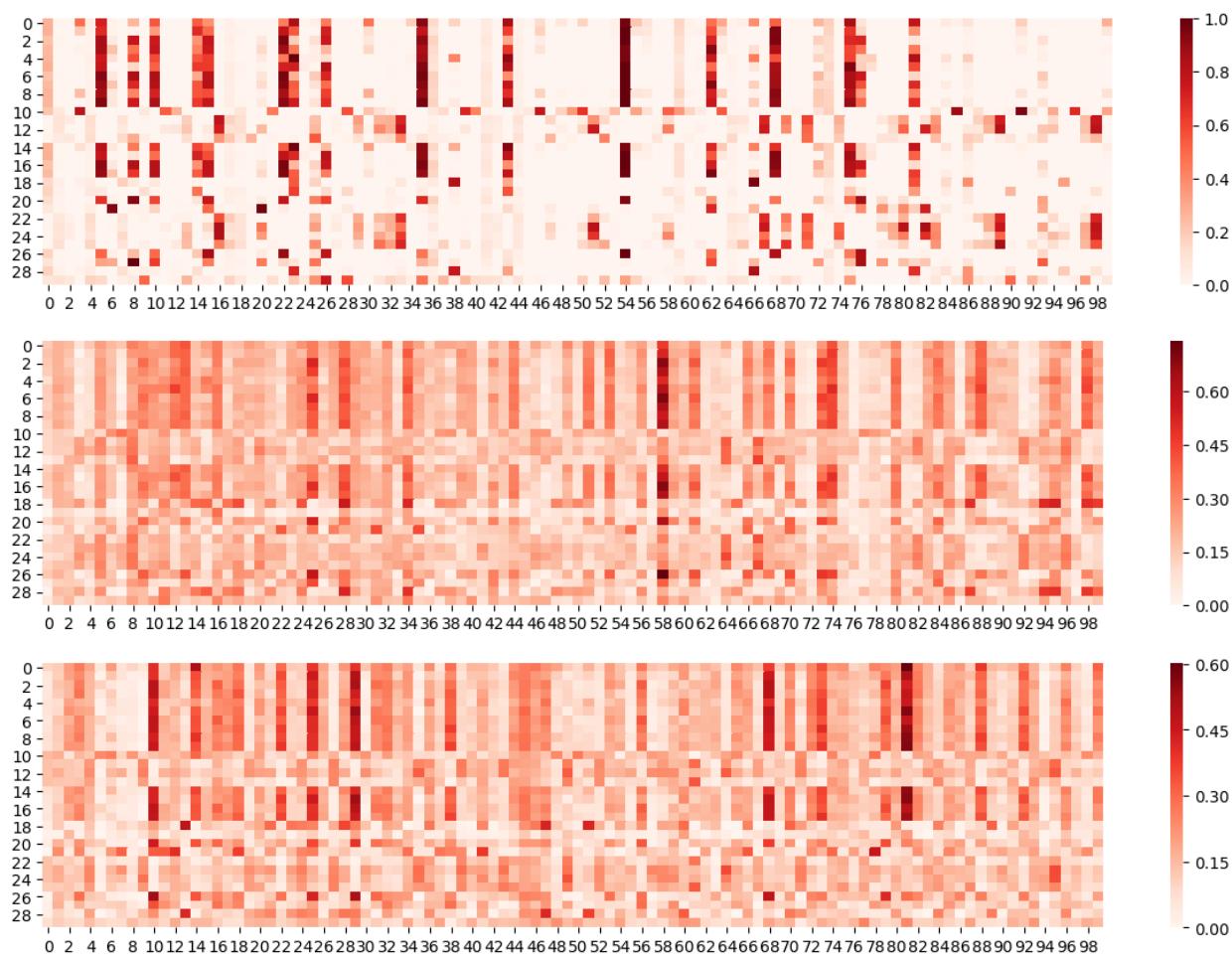
## 2.5 Emotion Task: Overlap between maps from GLM and maps from DBN layer 1, layer 2, layer 3



## 2.6 Social Task: Overlap between maps from GLM and maps from DBN layer 1, layer 2, layer 3

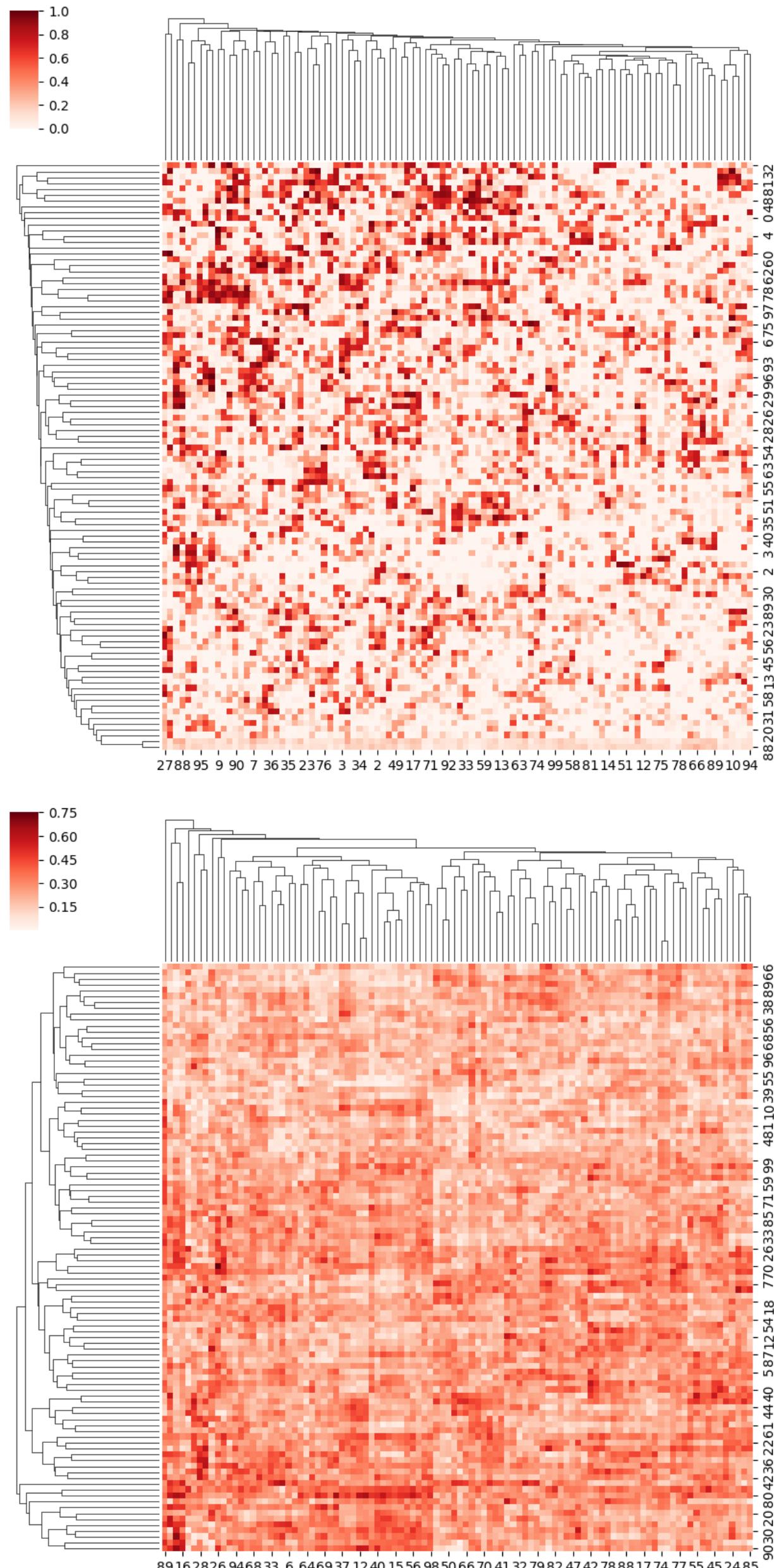


## 2.7 Working Memory Task: Overlap between maps from GLM and maps from DBN layer 1, layer 2, layer 3

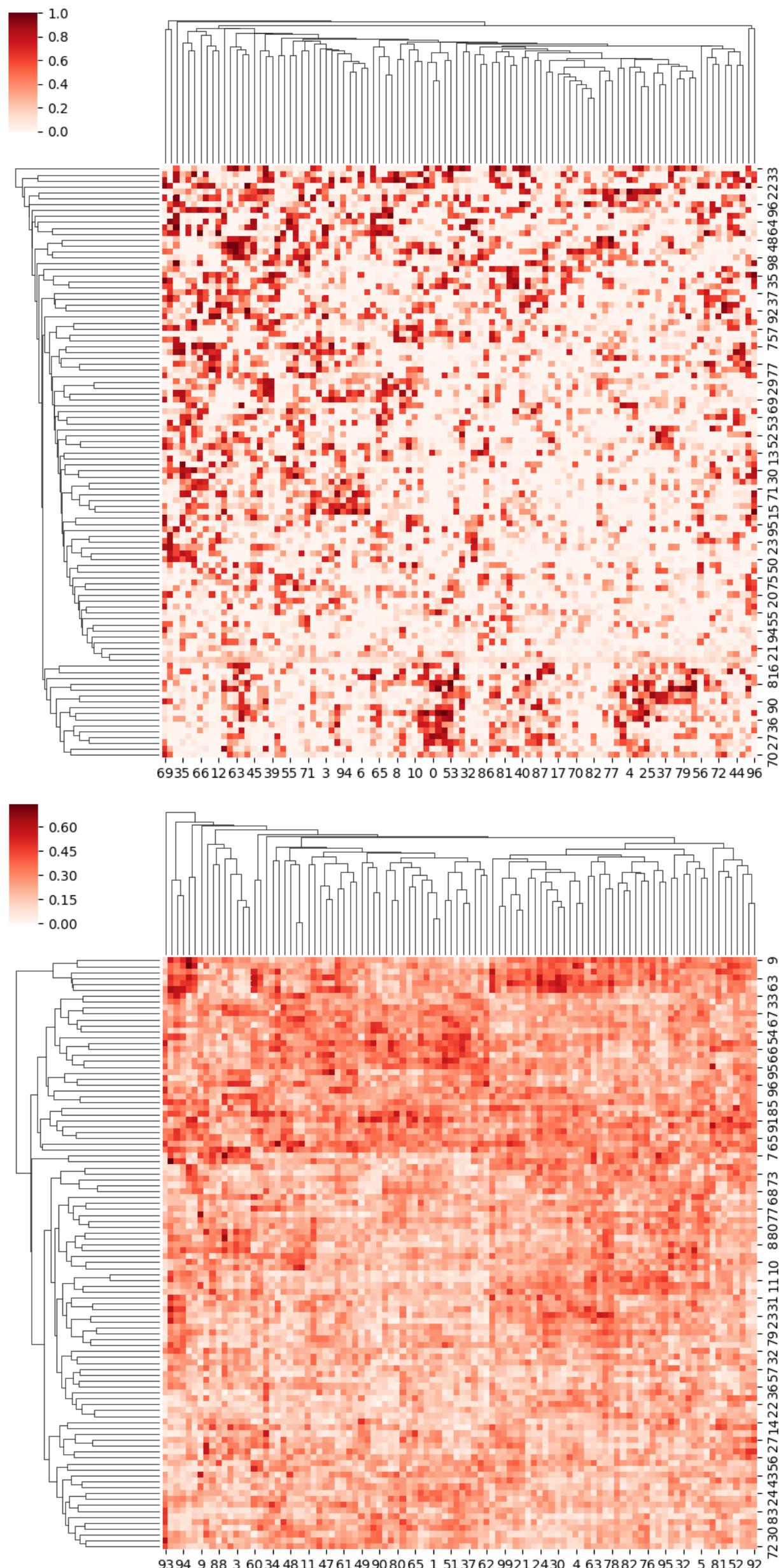


### 3 Hierarchy Analysis

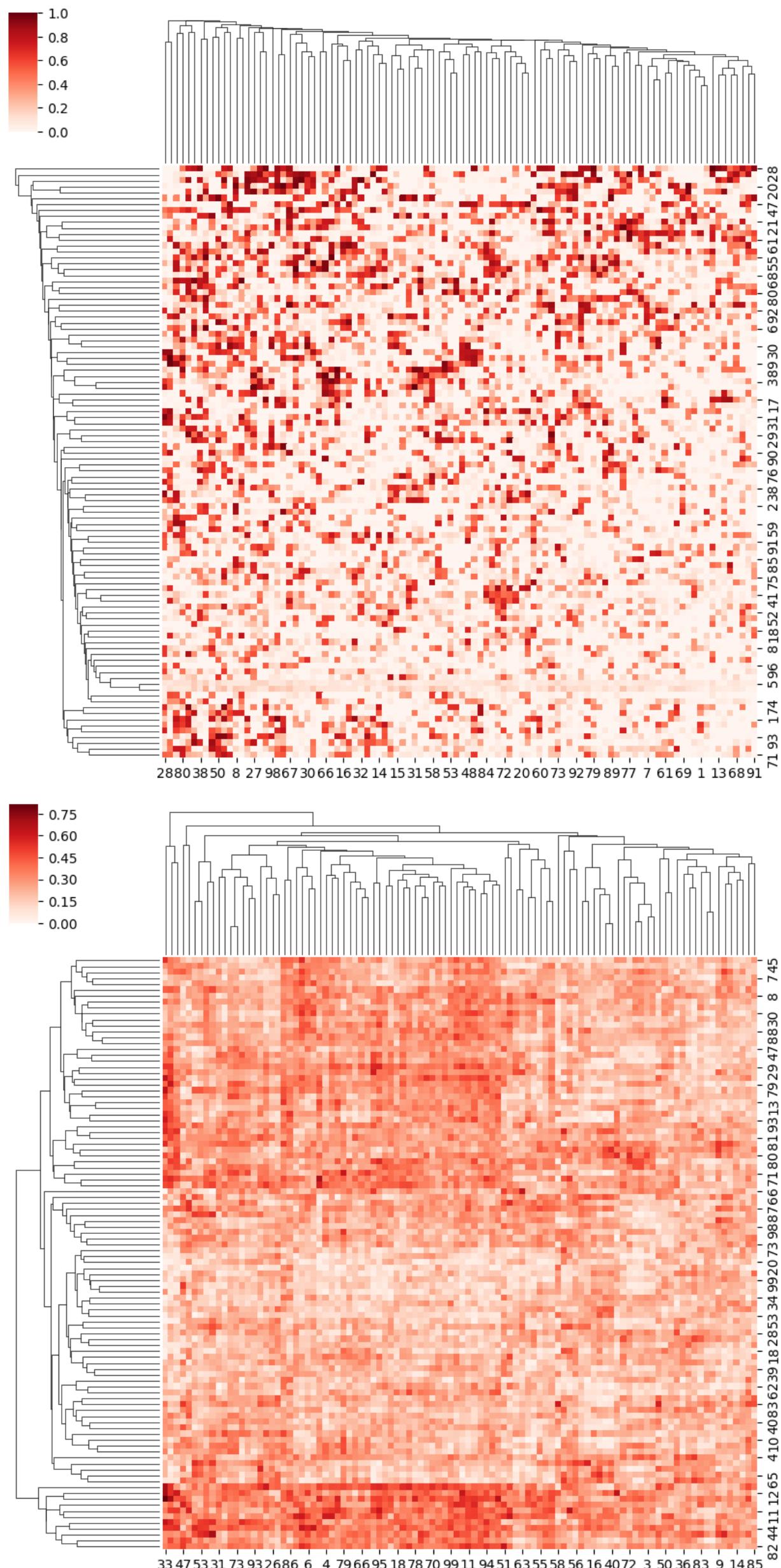
#### 3.1 Emotion Task: Hierarchy Score between DBN layer 1 and layer 2, layer 2 and layer 3



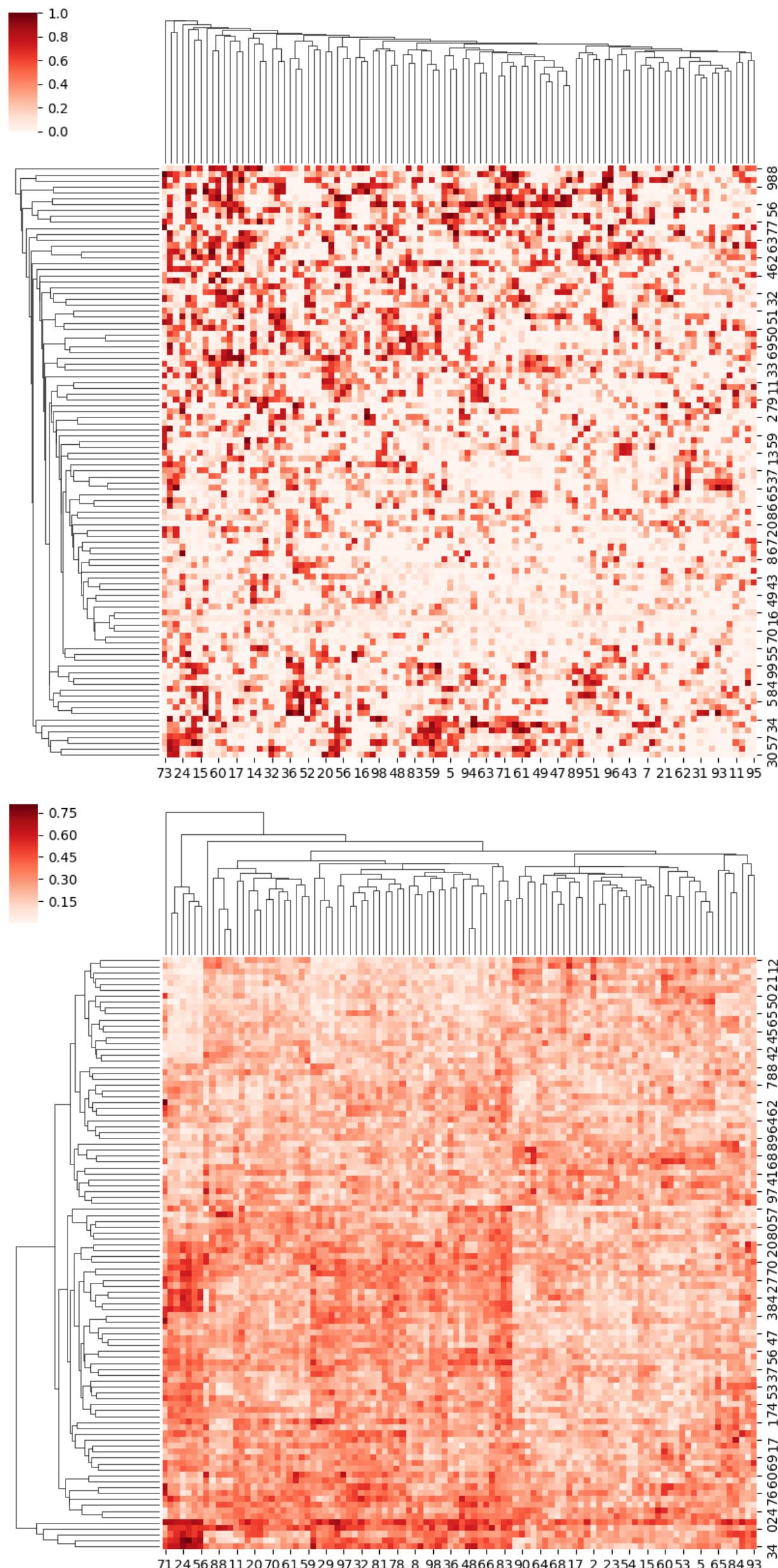
### 3.2 Gambling Task: Hierarchy Score between DBN layer 1 and layer 2, layer 2 and layer 3



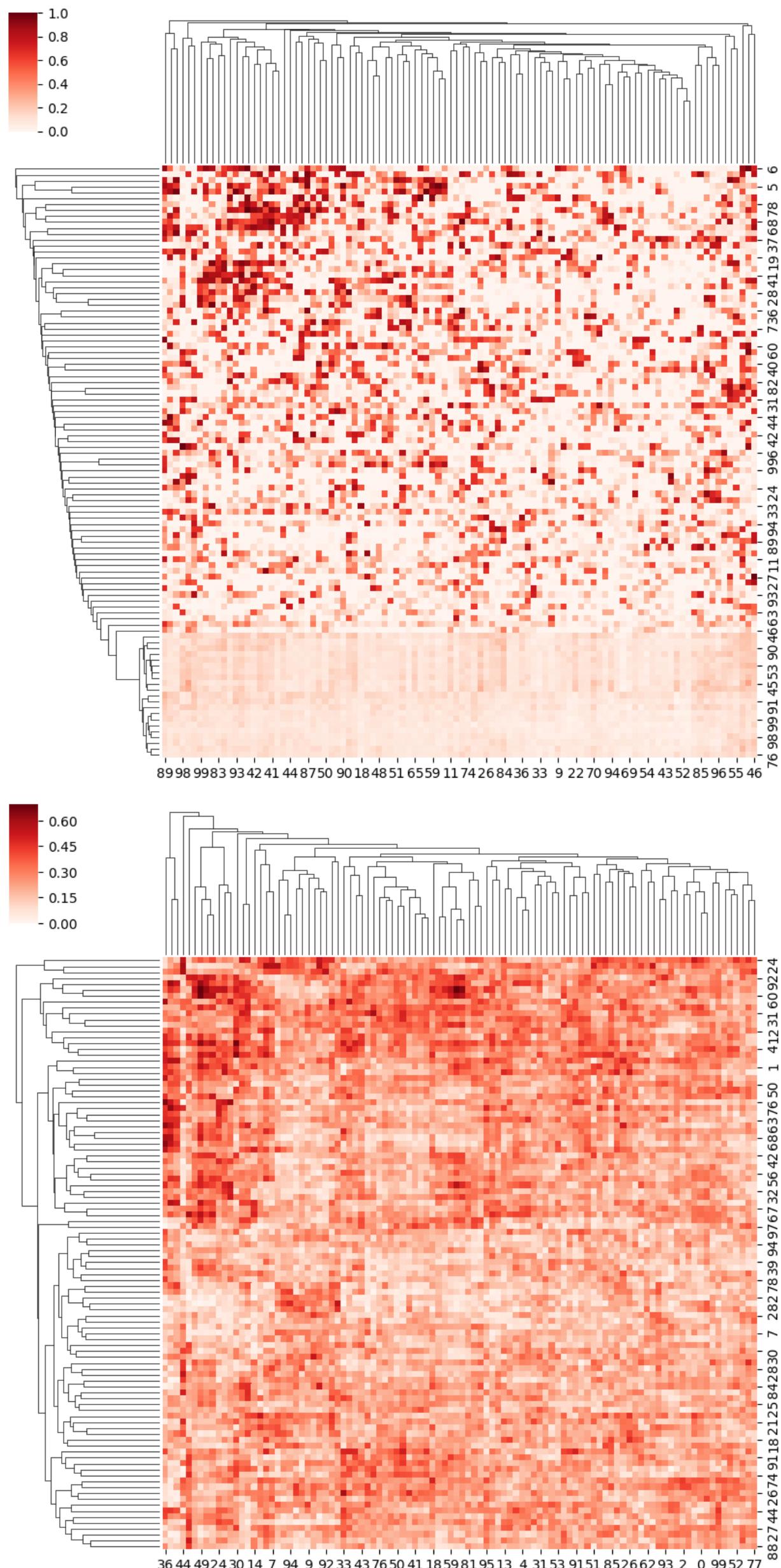
### 3.3 Language Task: Hierarchy Score between DBN layer 1 and layer 2, layer 2 and layer 3



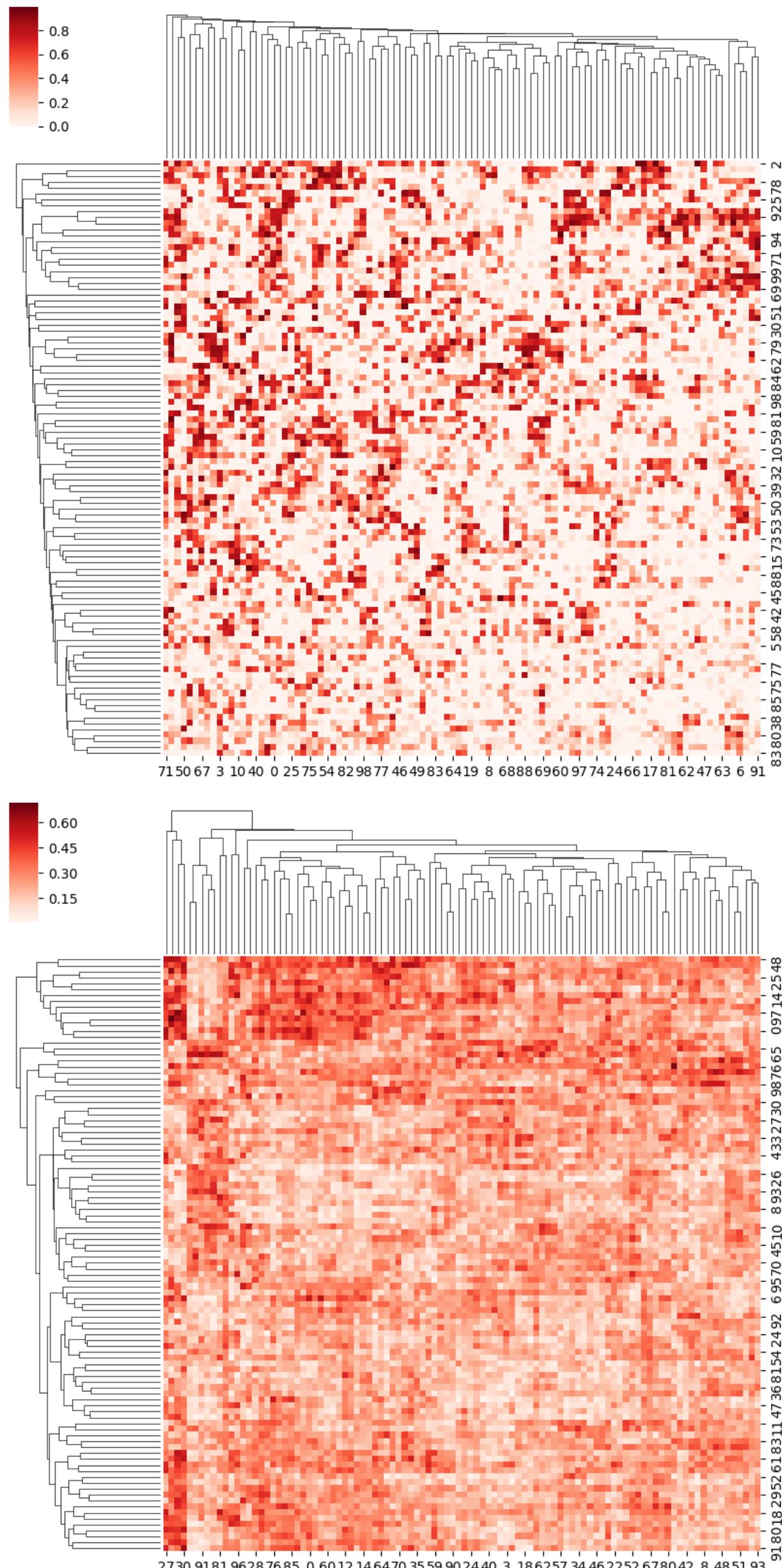
### 3.4 Motor Task: Hierarchy Score between DBN layer 1 and layer 2, layer 2 and layer 3



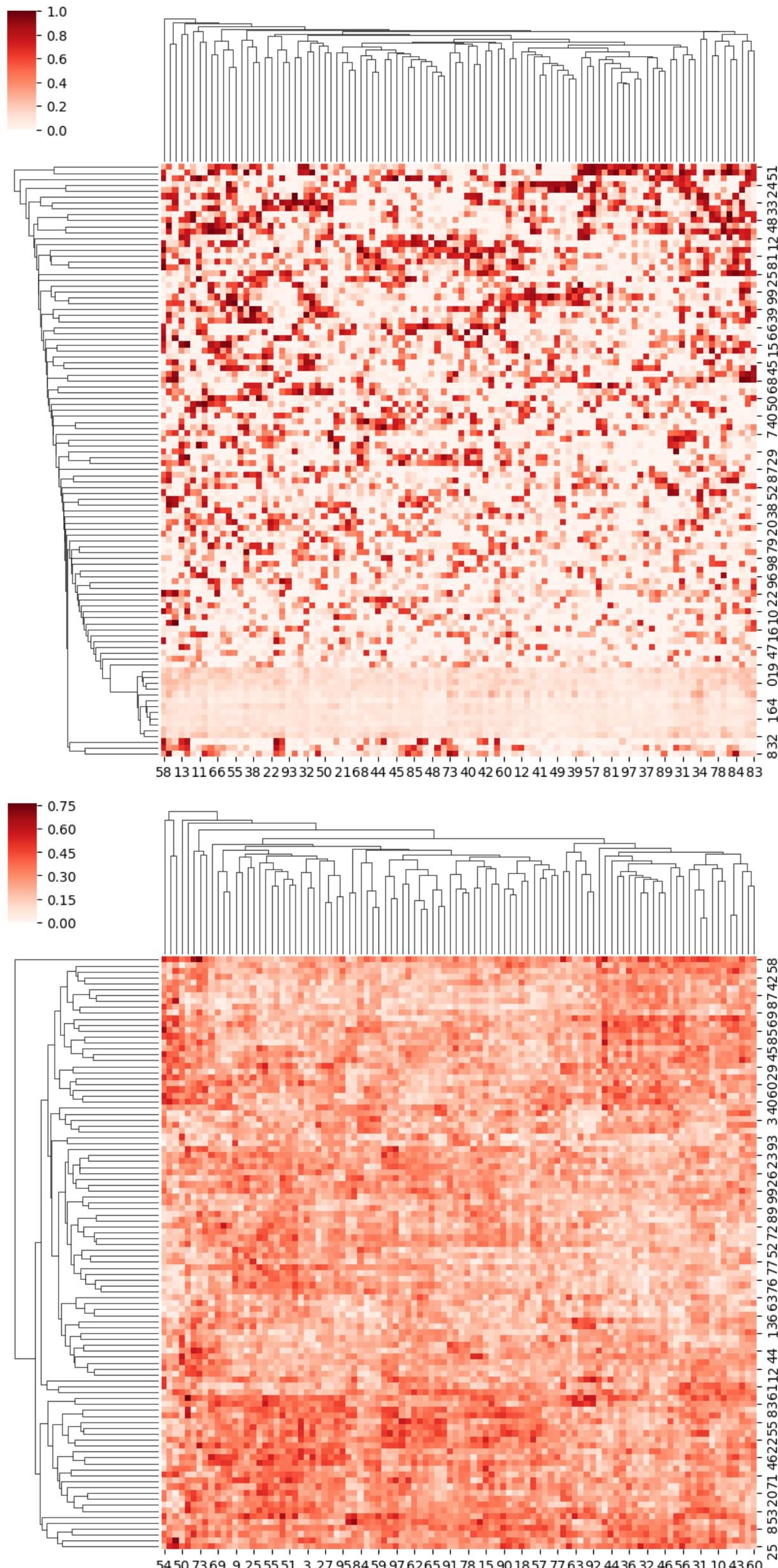
### 3.5 Relational Task: Hierarchy Score between DBN layer 1 and layer 2, layer 2 and layer 3



### 3.6 Social Task: Hierarchy Score between DBN layer 1 and layer 2, layer 2 and layer 3

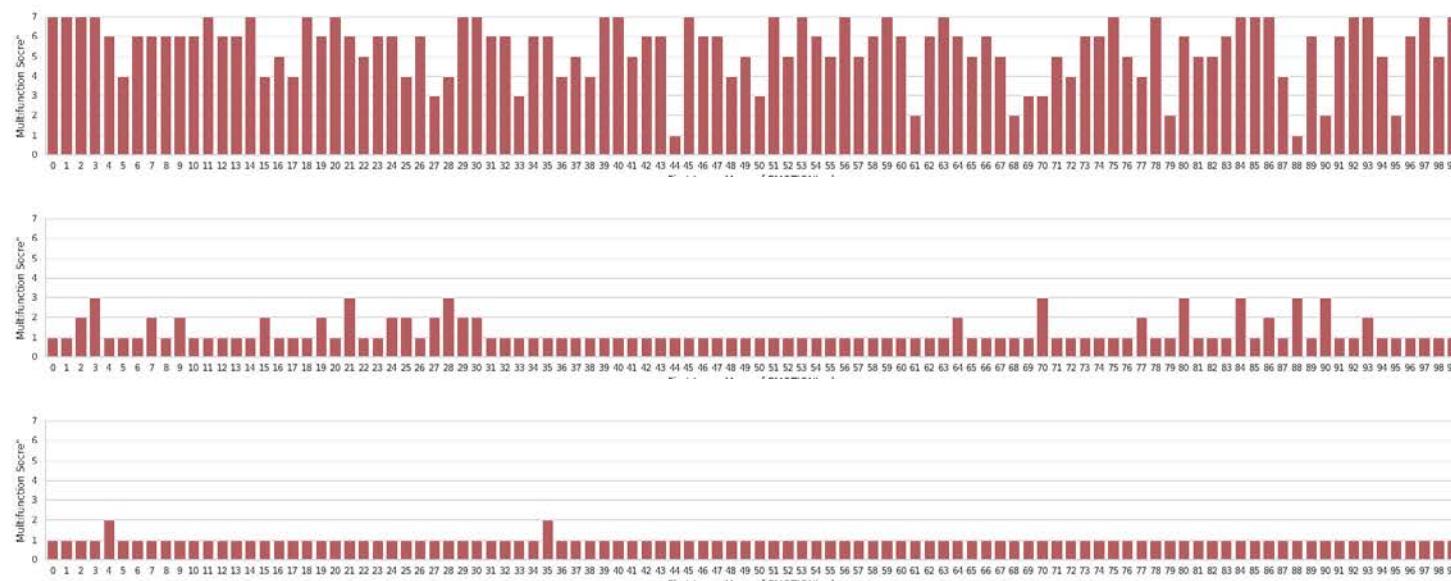


### 3.7 Working Memory Task: Hierarchy Score between DBN layer 1 and layer 2, layer 2 and layer 3



## 4 Multifunction

### 4.1 Emotion Task: Multifunction Score of each map from DBN layer 1, layer 2 and layer 3



### 4.2 Gambling Task: Multifunction Score of each map from DBN layer 1, layer 2 and layer 3



### 4.3 Language Task: Multifunction Score of each map from DBN layer 1, layer 2 and layer 3



#### 4.4 Motor Task: Multifunction Score of each map from DBN layer 1, layer 2 and layer 3



#### 4.5 Relational Task: Multifunction Score of each map from DBN layer 1, layer 2 and layer 3



#### 4.6 Social Task: Multifunction Score of each map from DBN layer 1, layer 2 and layer 3



#### 4.7 Working Memory Task: Multifunction Score of each map from DBN layer 1, layer 2 and layer 3

