RAFFAELE
TORNATORA
MAT. 786357

RELATORE: FRANCESCA
GASPARINI

CLASSIFICAZIONE DELLA PERSONALITÀ DI SOGGETTI DATE LE LORO RISPOSTE EMOTIVE ESPLICITE E IMPLICITE

INTRODUZIONE

- Studiare l'associazione tra personalità e risposte emotive di soggetti
- Metodo utilizzato: Cluster analysis
- Risposte emotive di tipo esplicito e implicito
- Personalità rappresentata attraverso due tratti del modello Big-Five
- Dati tratti dal database ASCERTAIN[1]

[1] Subramanian, R.; Wache, J.; Abadi, M.; Vieriu, R.; Winkler, S.; Sebe, N. ASCERTAIN: Emotion and personality recognition using commercial sensors. *IEEE Trans. Affect. Comput.* **2016**, doi:10.1109/TAFFC.2016.2625250.

DATABASE

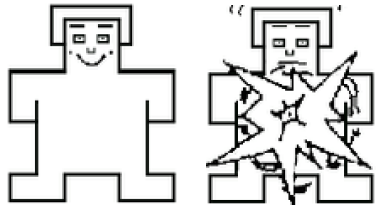
- Primo database conosciuto contenente personalità e risposte emotive
- Il più grande database emotivo in letteratura
- Rispetto ad altri databases contiene risposte emotive acquisite tramite sensori commerciali

Numero soggetti	**58**
Numero video	36
Lunghezza video	51-128 s ($\mu \pm \sigma = 80 \pm 20$)
Punteggi di valutazione emotiva	Arousal, Valence, Engagement, Liking, Familiarity
Scale di personalità	Extraversion, Agreeableness, Conscientiousness, Neuroticism, Openness
Segnali fisiologici	ECG, GSR, EEG frontale, caratterisitche facciali

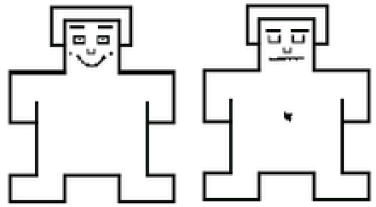
STIMOLI

- 36 Clips tratte da films
- Tipo audio-visuale
- Scelti uniformemente per reazione emotiva sullo spazio Valence-Arousal

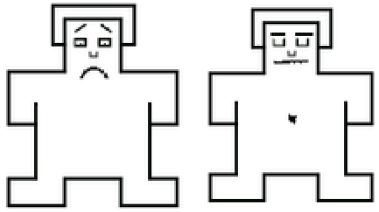
Da 1 a 9 AvAa



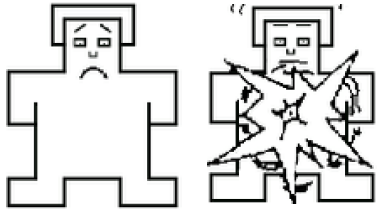
Da 10 a 18 AvBa

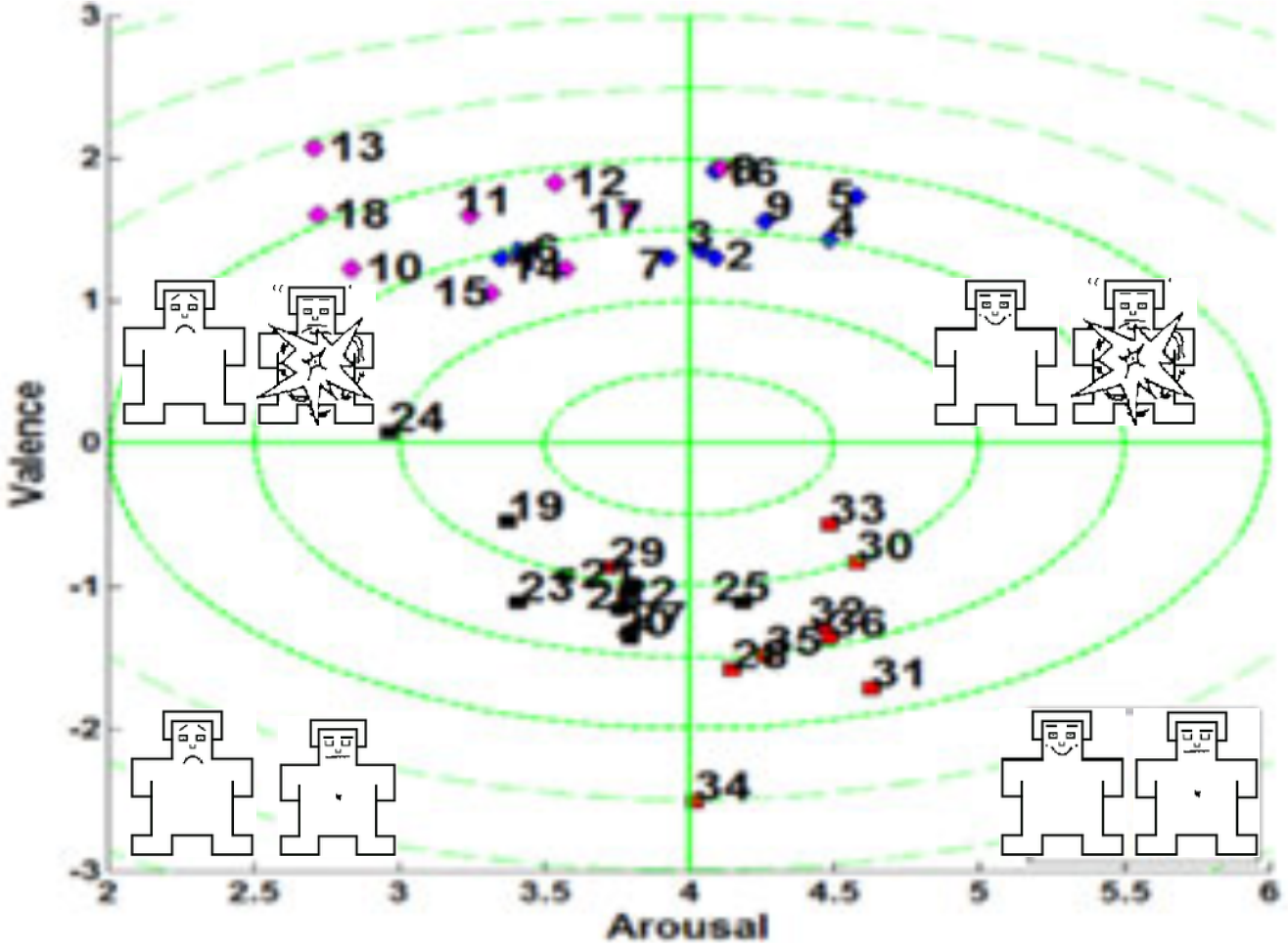


Da 19 a 27 BvBa



Da 28 a 36 BvAa

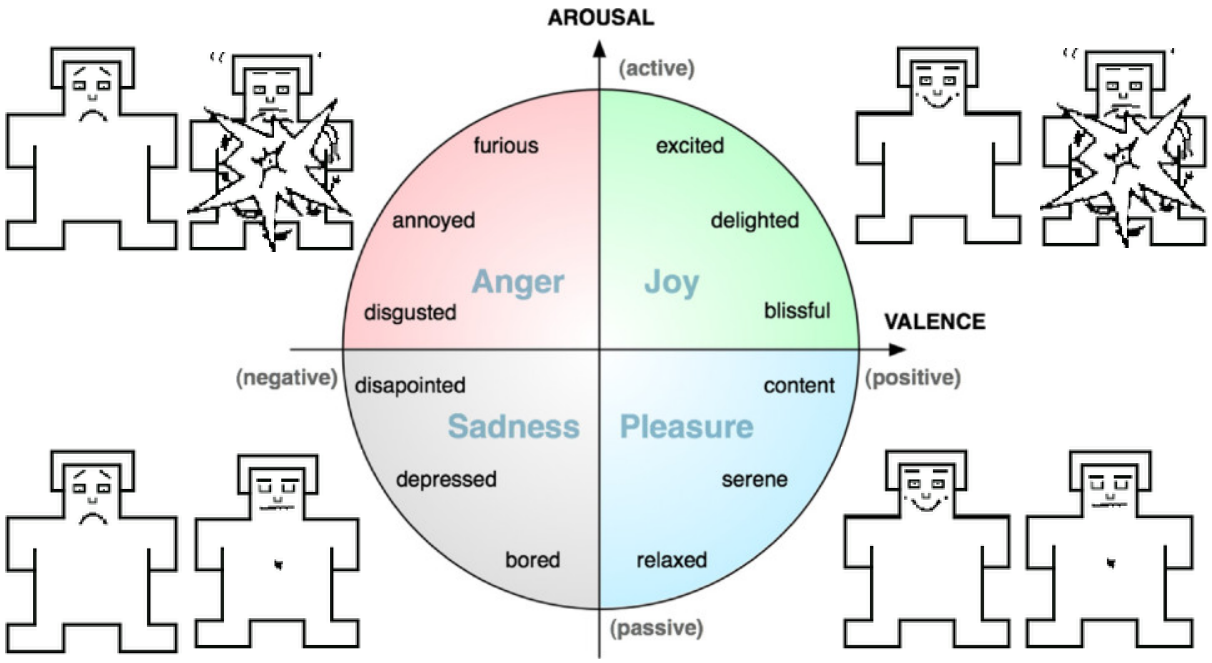




RISPOSTE EMOTIVE

ESPLICITE

- Acquisite tramite questionari self-assessment

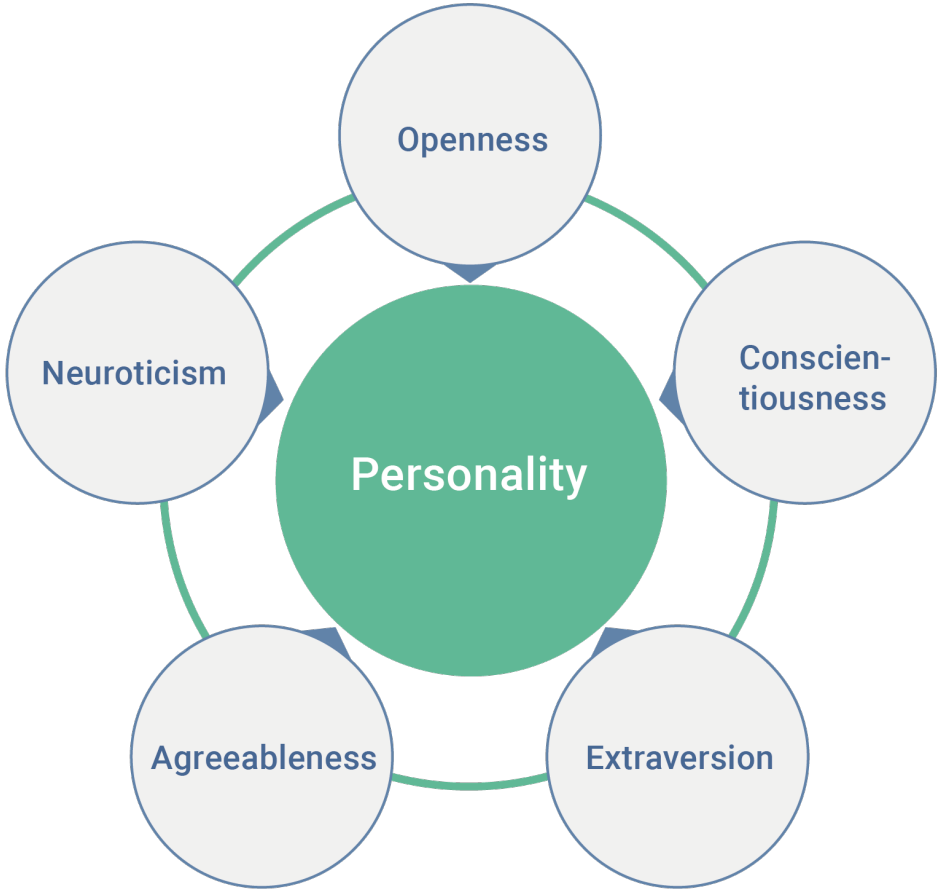


IMPLICITE

- 9 features estratte da segnali fisiologici tramite PCA
- Segnali fisiologici:
  - ECG: Battito cardiaco
  - GSR: Conduttanza pelle

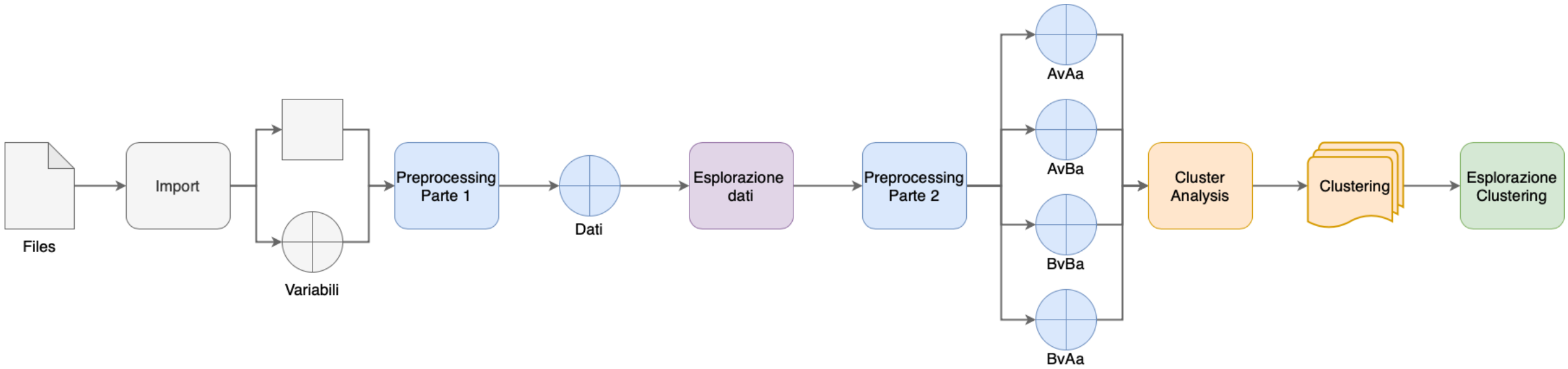
MODELLO BIG-FIVE

- 2 tratti: Extraversion e Neuroticism
- Personalità:
  - Sociable - Confident
  - Sociable - Nervous
  - Reserved - Nervous
  - Reserved - Confident
- Acquisita tramite questionario Big Five Scale Marker (BFSM) [1]



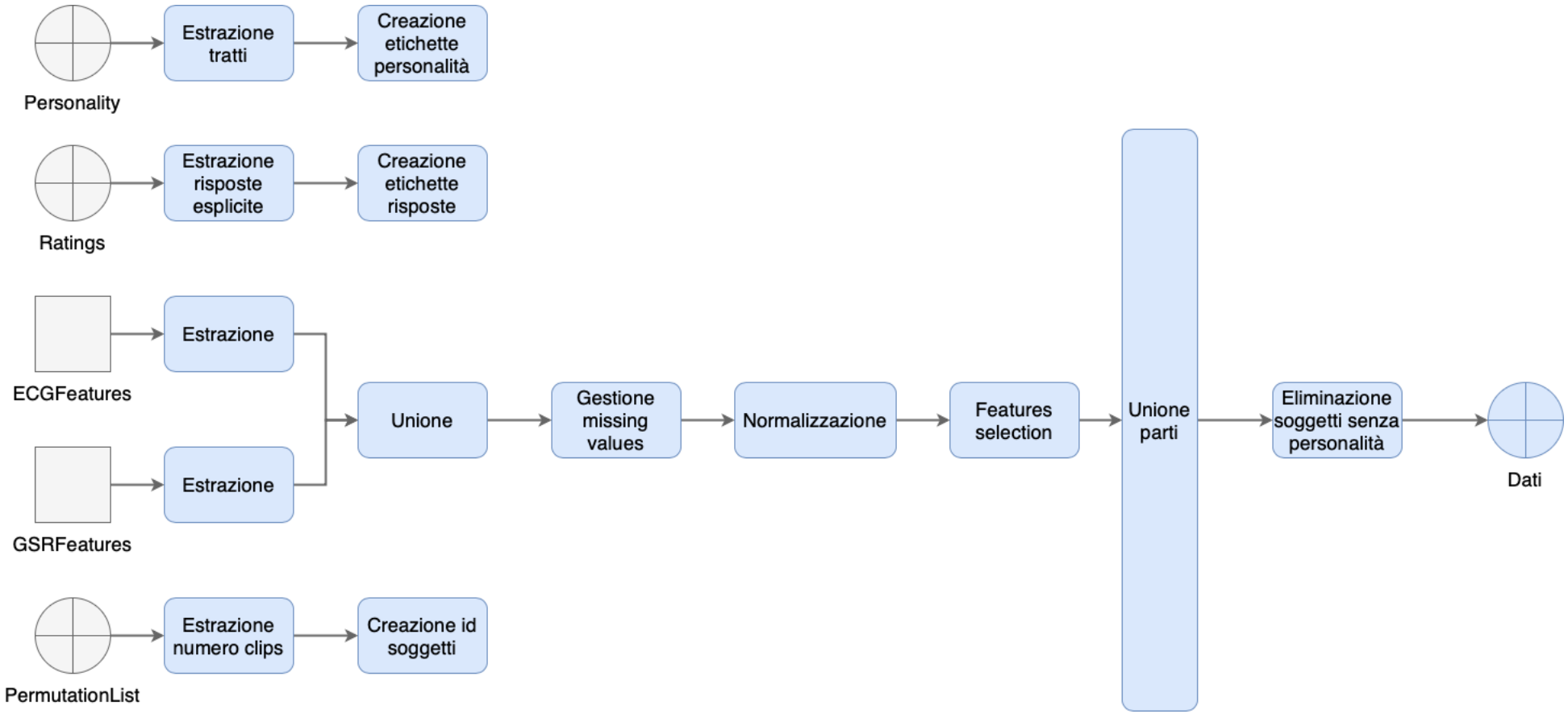
[1] M. Perugini and L. Di Blas, "Analyzing personality-related adjec- tives from an eticemic perspective: The big five marker scale (BFMS) and the Italian AB5C taxonomy," in Big Five Assessment. Boston, MA, USA: Hogrefe & Huber, 2002

PROCEDIMENTO



MATLAB

PREPROCESSING



DATI

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2	1	19	'EstSta'	2	3	'Ne'	2.6978	0.6185	-0.3241	0.1321	0.0575	1.861
3	1	11	'EstSta'	-2	1	'BvBa'	0.6524	-0.0570	0.1502	-2.6130	-1.5749	0.045
4	1	31	'EstSta'	0	6	'Ne'	-0.1519	0.1533	-0.1259	1.4435	-1.1905	-1.503
5	1	6	'EstSta'	1	4	'AvAa'	3.5605	0.7997	-0.4226	-0.4405	-0.4261	1.647
6	1	35	'EstSta'	0	4	'Ne'	0.0319	-0.4065	-0.0146	-0.3505	-1.0804	0.251
7	1	14	'EstSta'	1	3	'Ne'	1.7711	-0.2690	-0.1749	0.1749	-0.5171	2.035
8	1	24	'EstSta'	2	4	'AvAa'	3.9626	-1.3019	-0.5207	-1.8668	1.6083	3.949
9	1	8	'EstSta'	2	4	'AvAa'	-0.0518	-1.3032	-0.0474	-0.0229	0.1225	2.509
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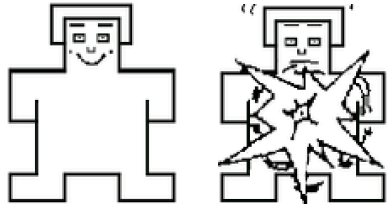

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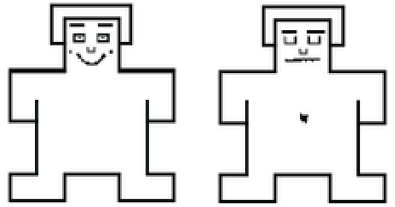
7	1	2	'EstSta'
8	1	3	'EstSta'
9	1	5	'EstSta'
10	2	8	'IntIns'



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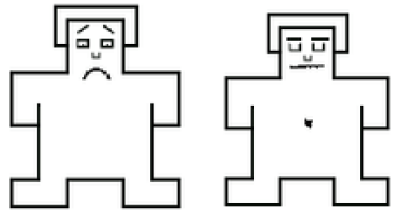
4	1	12	'EstSta'
5	1	15	'EstSta'
6	1	18	'EstSta'
7	1	17	'EstSta'
8	1	10	'EstSta'
9	1	16	'EstSta'
10	2	12	'IntIns'



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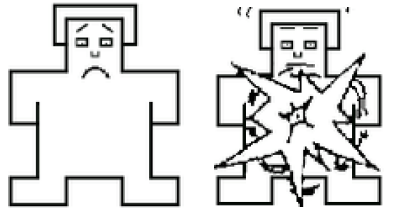
10	2	26	'IntIns'



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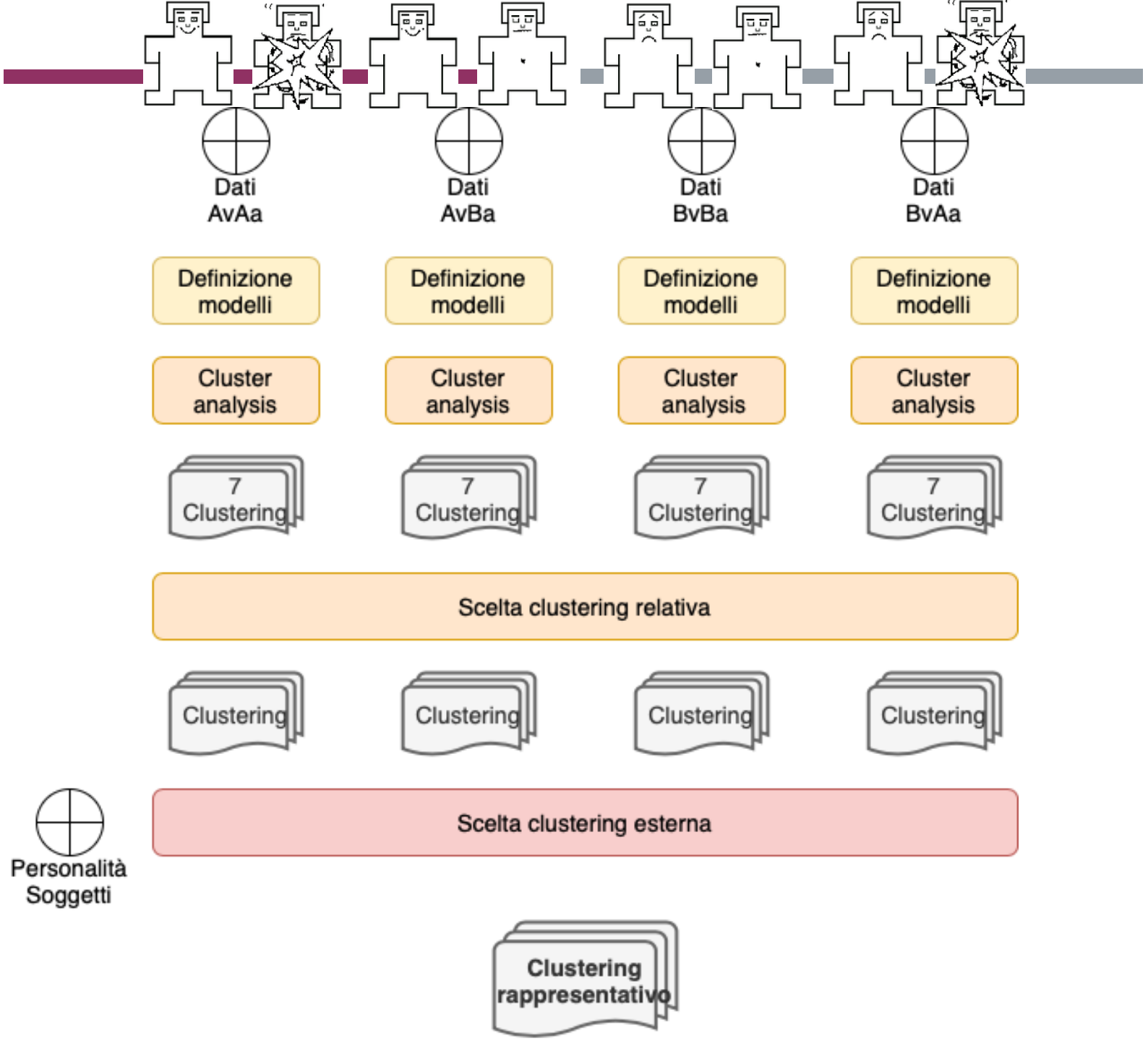
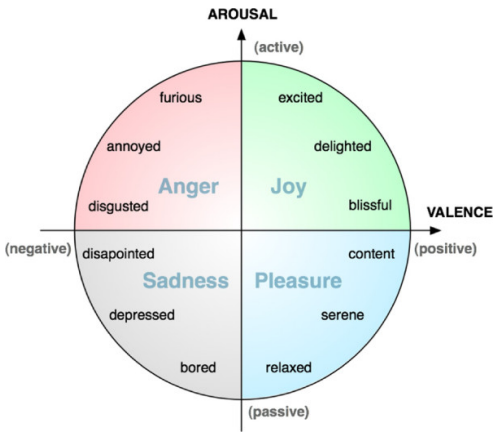
5	1	34	'EstSta'
6	1	36	'EstSta'
7	1	28	'EstSta'
8	1	29	'EstSta'
9	1	33	'EstSta'
10	2	32	'IntIns'

CLUSTER ANALYSIS





Risposte esplicite

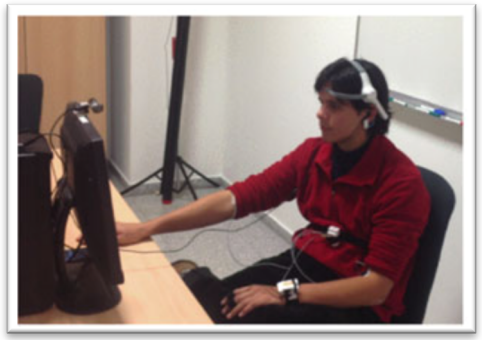
Definizione modello gerarchico	Definizione algoritmo K-Means	Definizione modello GM	Definizione SOM
Modello gerarchico	Algoritmo K-Means	Modello GM	SOM
Cluster analysis	Cluster analysis	Cluster analysis	Cluster analysis
Clustering	Clustering	Clustering	Clustering

Risposte implicite

Definizione modello gerarchico	Definizione algoritmo K-Means	Definizione SOM
Modello gerarchico	Algoritmo K-Means	SOM
Cluster analysis	Cluster analysis	Cluster analysis
Clustering	Clustering	Clustering

Scelta interna Clustering

Miglior Clustering



DEFINIZIONE MODELLI

MODELLI GERARCHICI

- Scelta parametri attraverso Coefficiente di Correlazione di Cophet[1]
- Definiti sulle risposte esplicite con funzione di distanza Hamming e metodo di collegamento Average
- Definiti sulle risposte implicite con Funzione di ditanza Euclidea quadrata e metodo Average, tranne reazioni AvBa con funzione Chebyshev

ALGORITMI K-MEANS

- Scelta parametri attraverso Coefficiente di Silhouette
- Definiti tutti con funzione di distanza Euclidea quadrata

MODELLI GAUSSIAN MIXTURE

- Scelta parametri attraverso Akaike Criterion Information (AIC)[2]
- Definiti con matrice di covarianza di tipo Full Unshared, mentre quello su reazioni AvBa con tipo Full Shared

SOM (Self-Organized Map)

- Tipo neurale (ANN)
- Layer di output 2x2

[1] Sokal, R. R. and F. J. Rohlf. 1962. The comparison of dendrograms by
objective methods. Taxon, 11:33-40.
[2]
https://it.wikipedia.org/wiki/Test_di_verifica_delle_informazioni_di_Akaike

METRICHE DI VALUTAZIONE

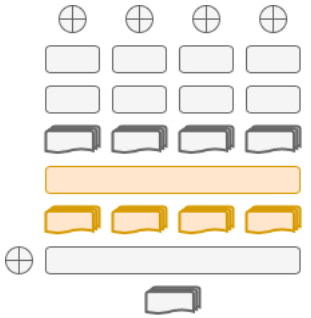
Metrica relativa: indice di Calinski-Harabasz

$$ch(k) = \frac{trB_k/(k-1)}{trW_k/(n-k)}$$

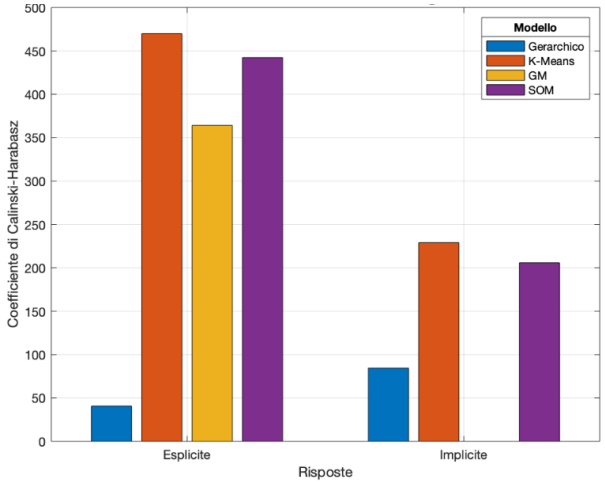
Metrica esterna: indice di Fowlkes and Mallows

$$FM = \sqrt{\frac{TP}{TP+FP} * \frac{TP}{TP+FN}} \in [0,1]$$

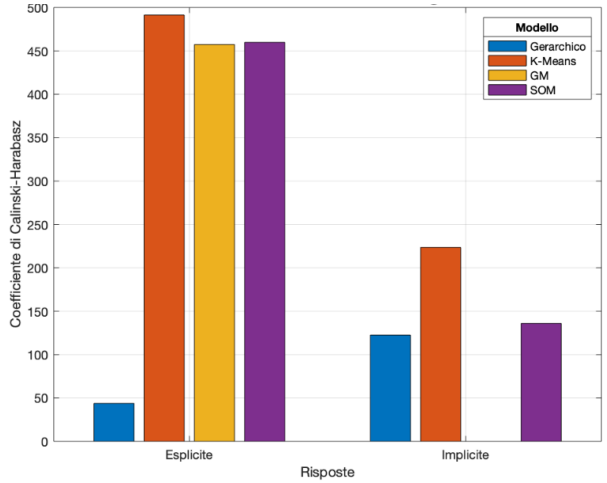
RISULTATI: SCELTA RELATIVA DEL CLUSTERING



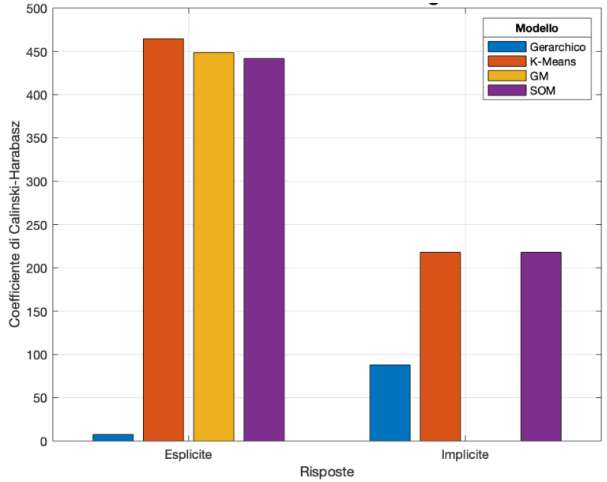
AvAa



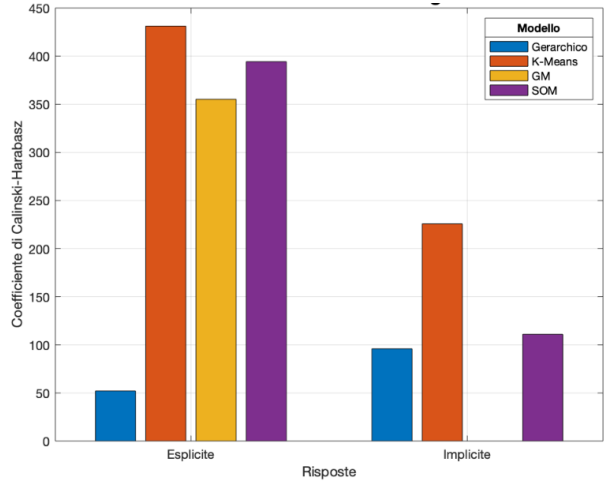
AvBa



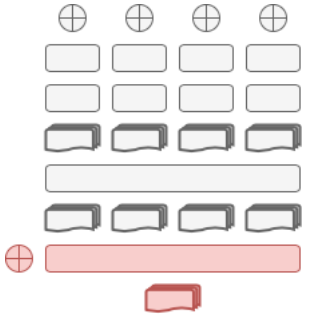
BvBa

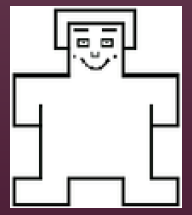
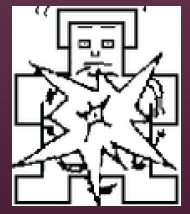
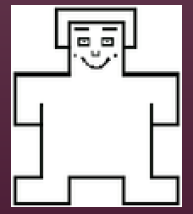
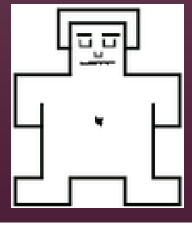
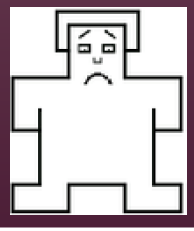
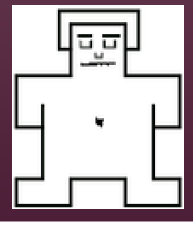
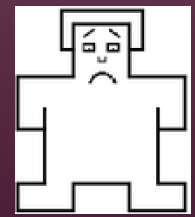
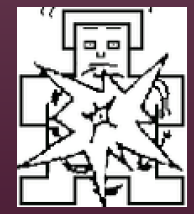


BvAa



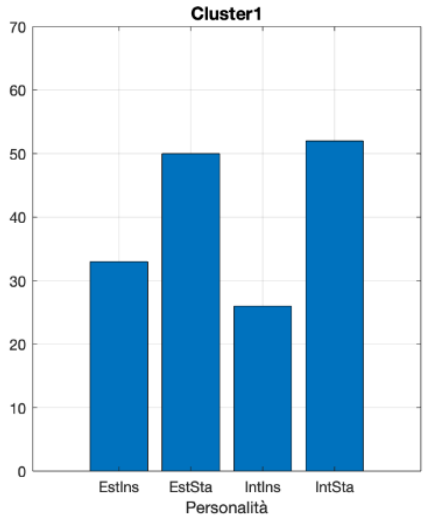
RISULTATI: SCELTA ESTERNA DEL CLUSTERING

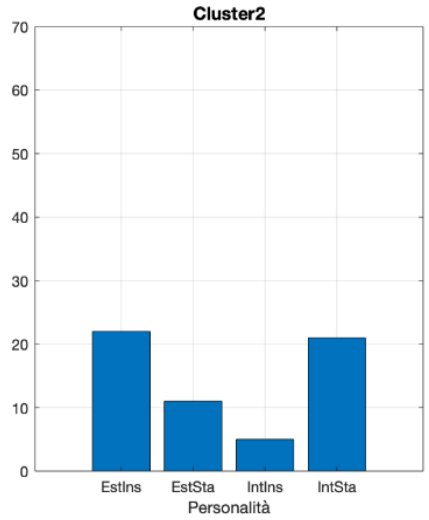


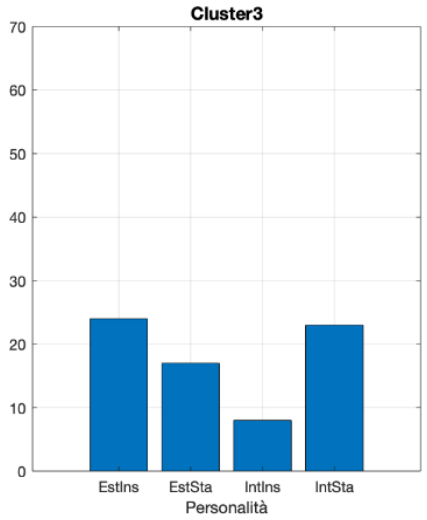
	 	 	 	 
Indice FM	0.2886	0.2655	0.2802	0.2684

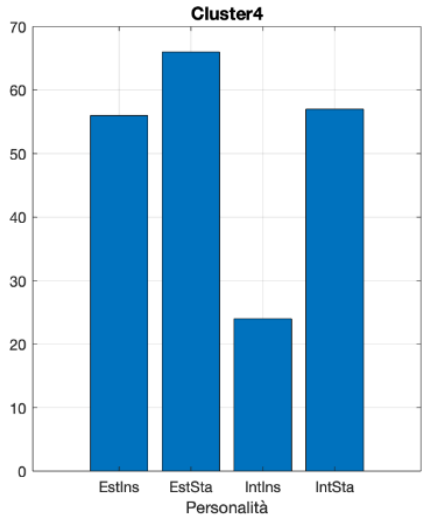
ESPLORAZIONE CLUSTERING

NUMERO SOGGETTI CON ALMENO UNA RISPOSTA



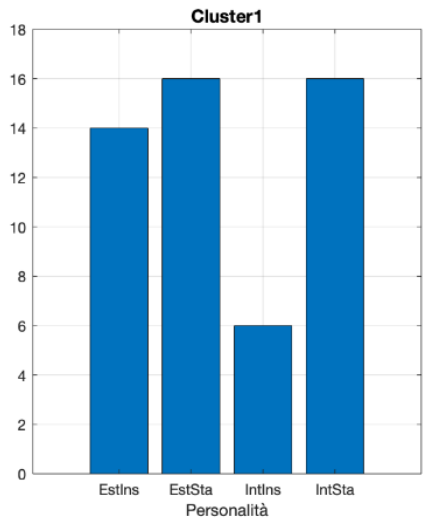


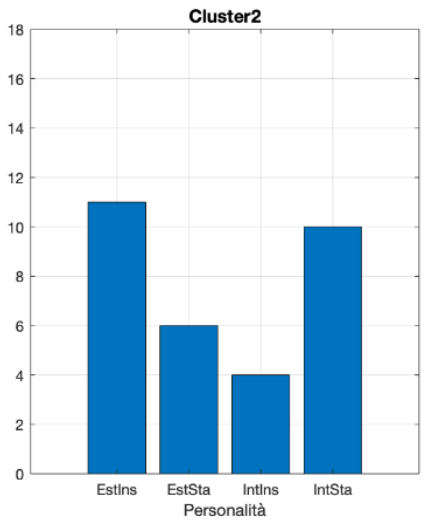


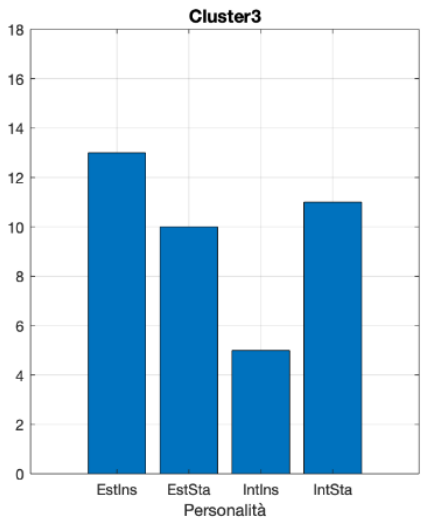


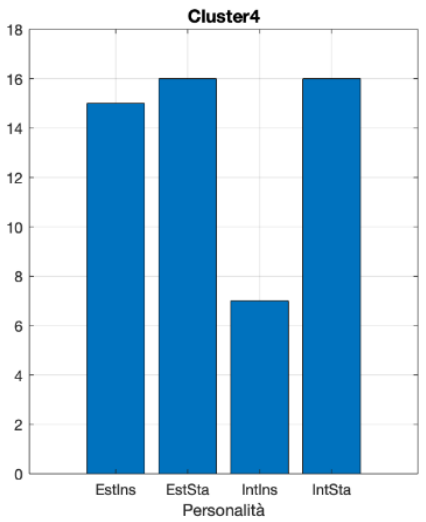
ESPLORAZIONE CLUSTERING

NUMERO RISPOSTE PER PERSONALITÀ









CONCLUSIONI

- Dall'analisi è stato ottenuto un Clustering ottenuto non del tutto significativo della personalità
- Possibili cause:
  - Scelta dei dati
  - Scelta del modello di personalità
  - Contesto di somministrazione degli stimoli
  - Scarsità dei dati

GRAZIE PER L'ATTENZIONE