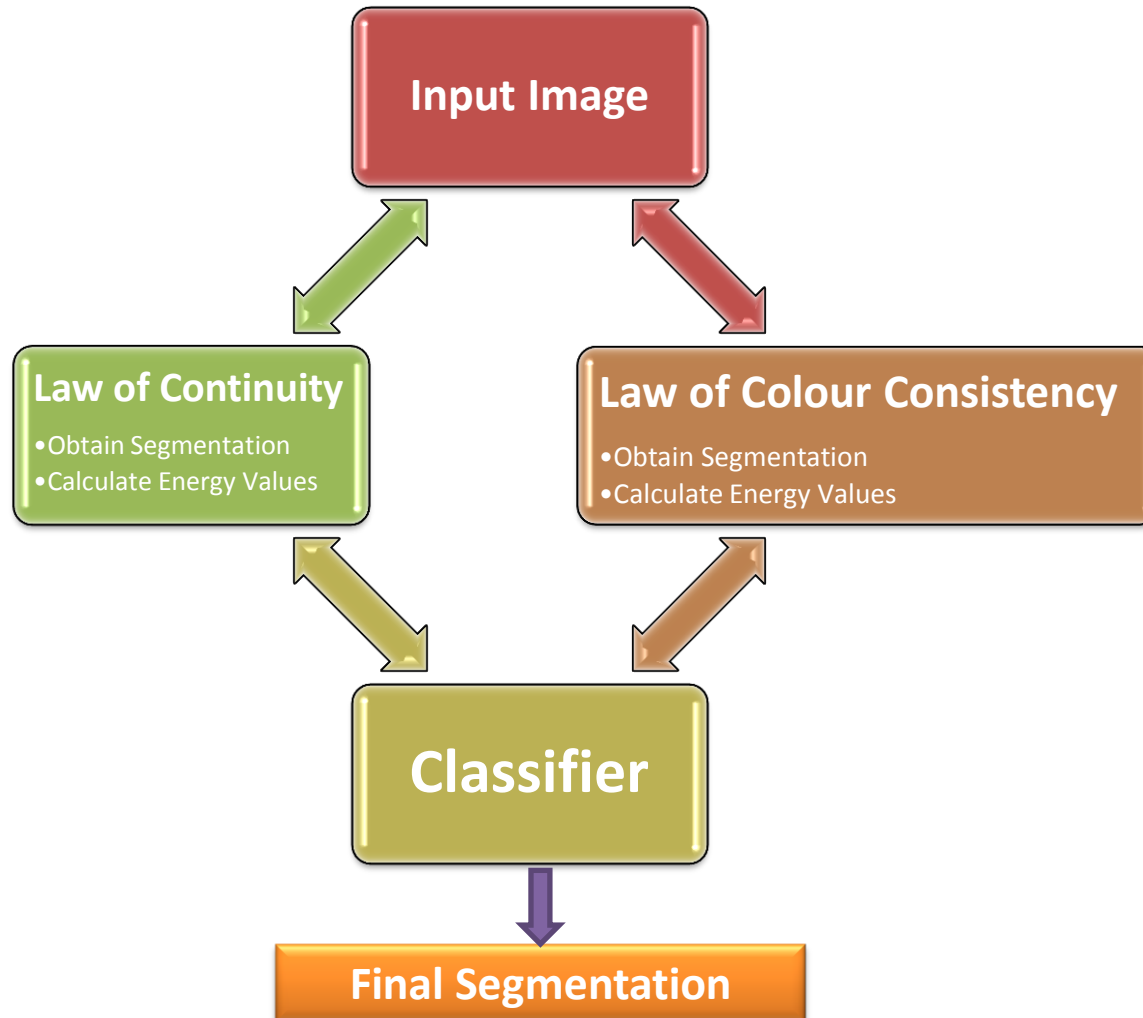


# **Computational Model Of Gestalt Laws**

Rajiv Krishna Omar

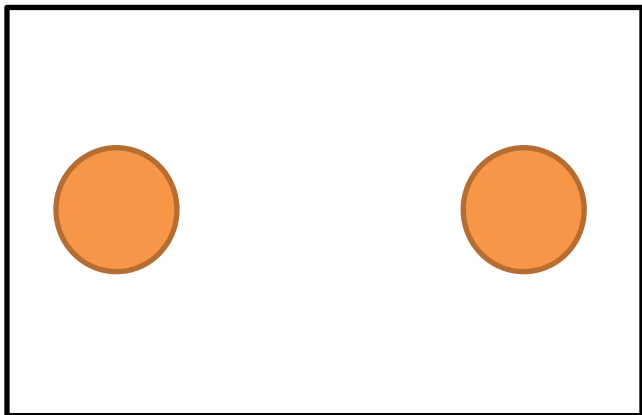
Advisor: Amitabha Mukerjee

# Prior Work

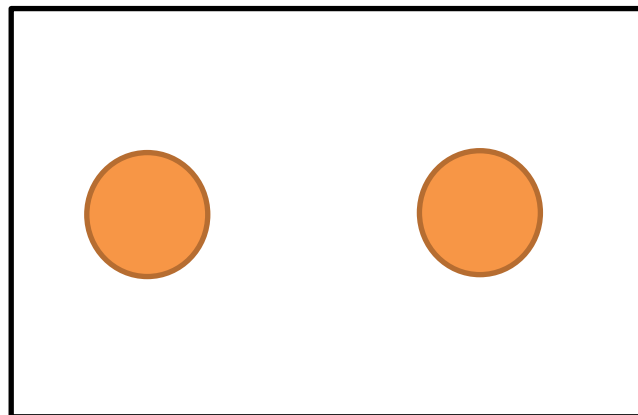


# Addition of Law of Proximity

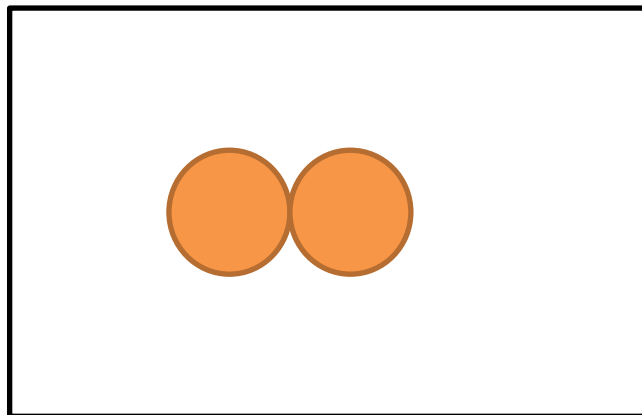
- Break image into connected components
- Calculate size + centroid of connected parts
- Calculate ratio:  $\frac{\textit{Minimum Distance}}{\textit{Size of Objects}}$



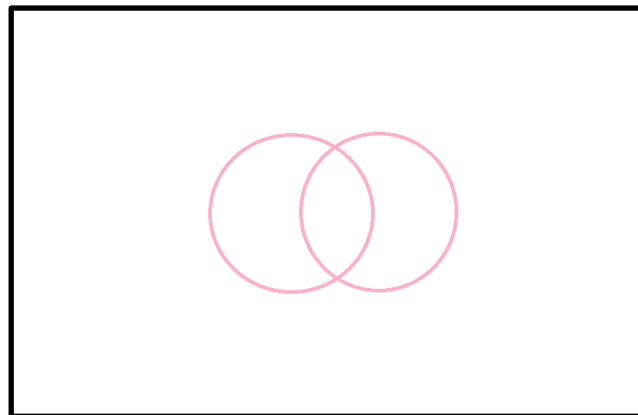
**Isolated**



**Group by Proximity**



**Group by Contour**

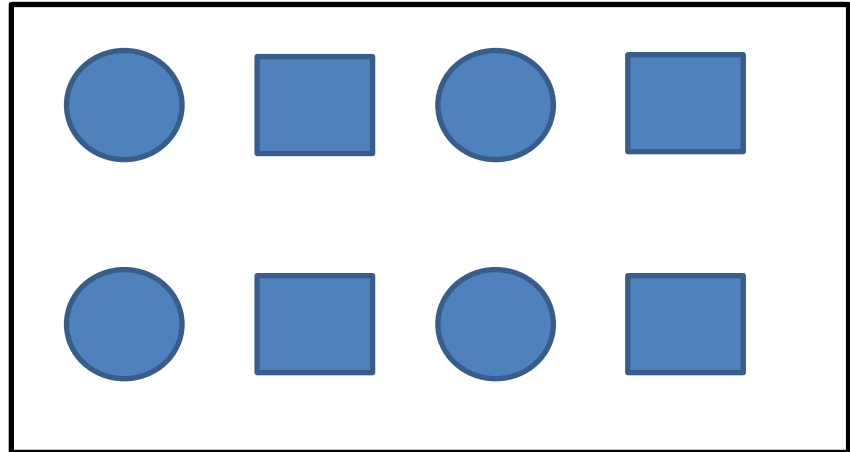
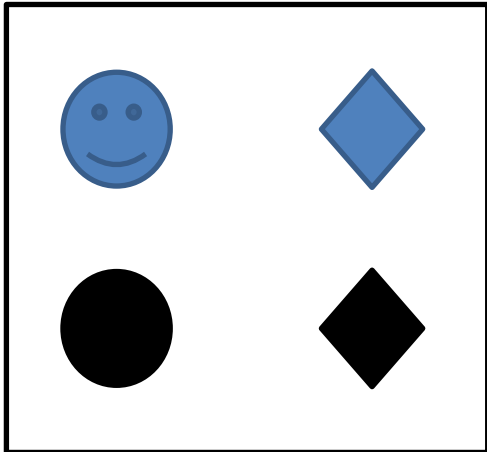


**Group by Continuity**

# Comparison between Gestalt cues :

*Proximity, Shape, Colour, Size, Curvature*

- Created 33 images with conflicting gestalt cues



- Surveyed 21 persons to segment the images

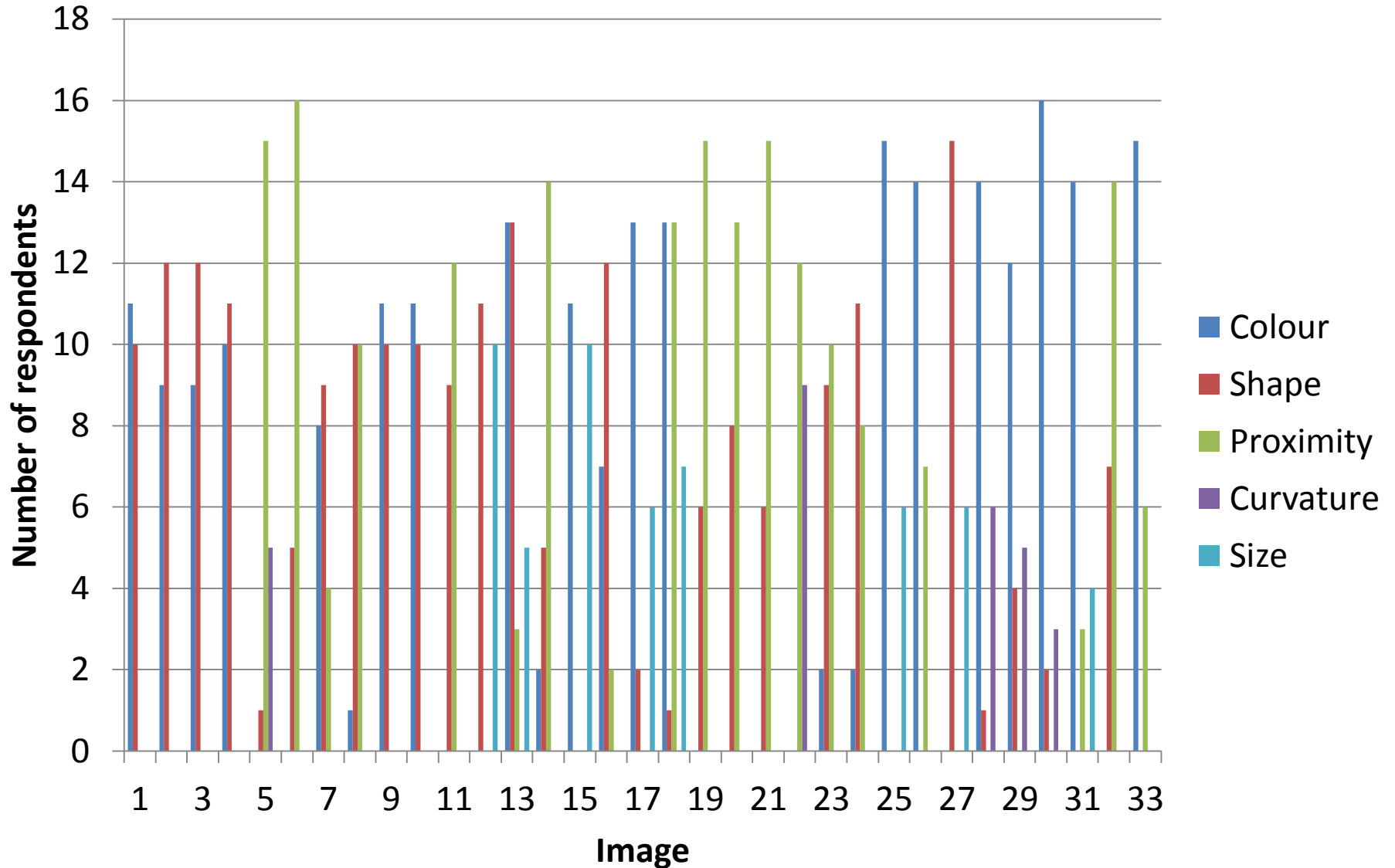
# Ordering of Gestalt Cues

- Asked to segment image into Rows, Columns or Diagonals
- Found ordering of cues as:

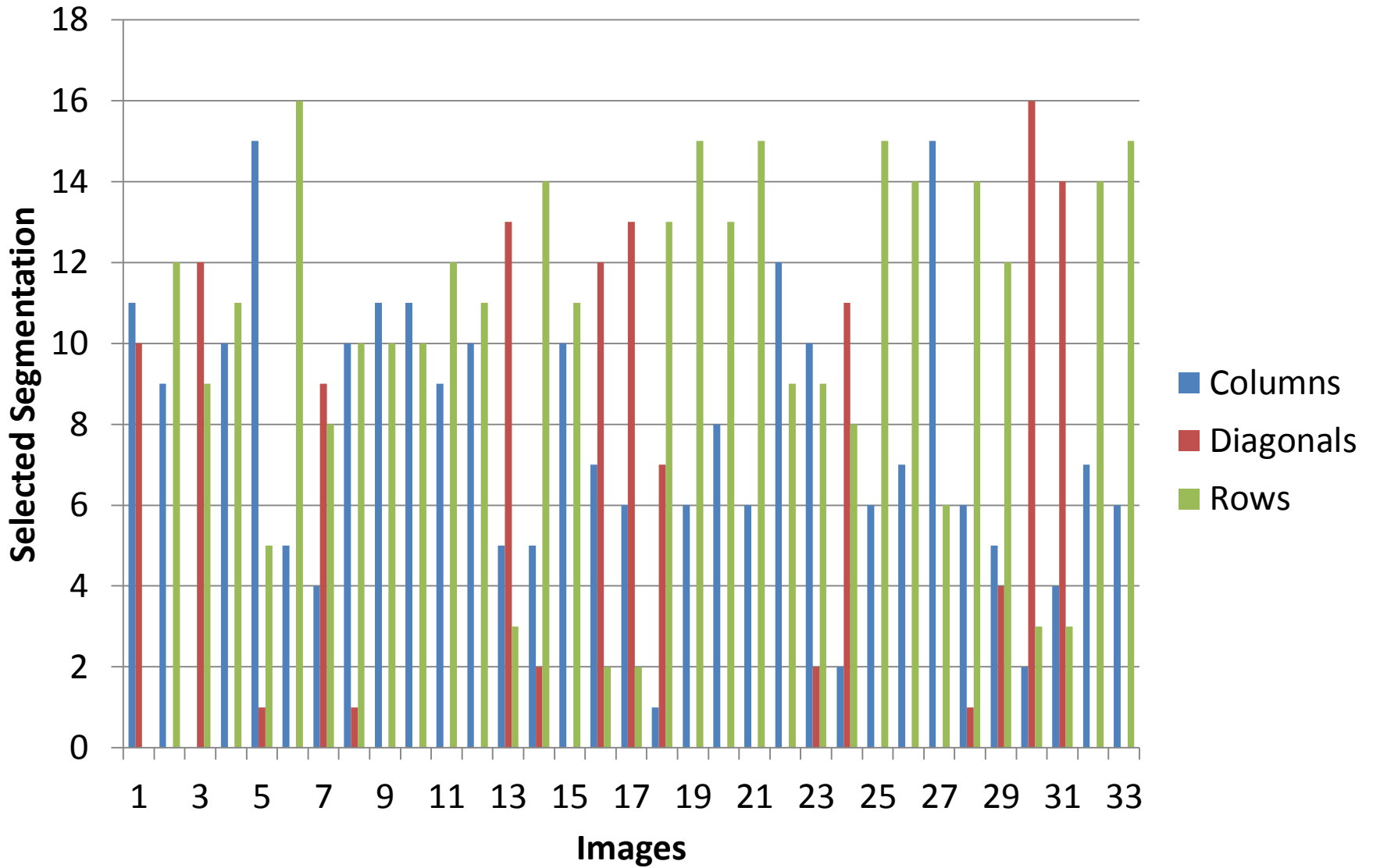
Proximity > Shape > Colour > Size > Curvature

- Very high dependency on the person doing segmentation task

# Survey Results

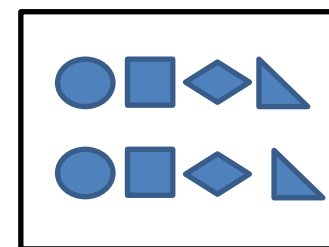
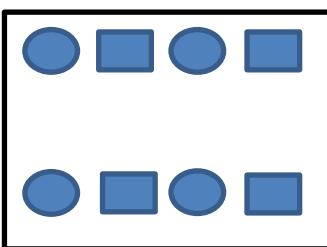
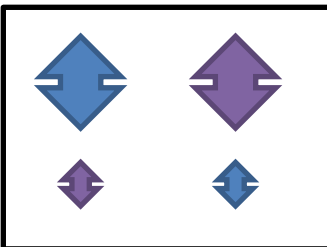
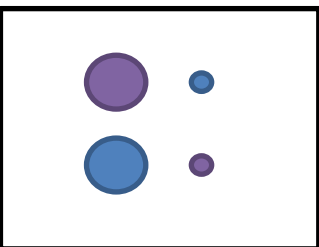
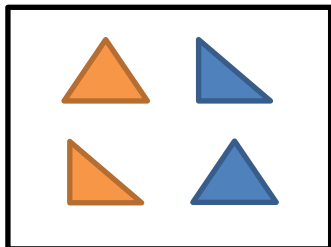
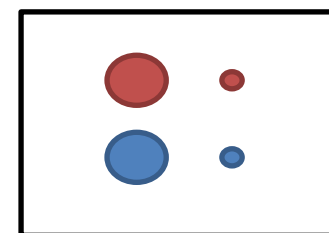
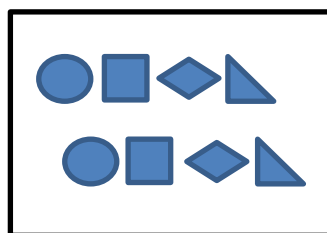
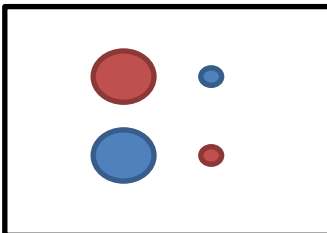
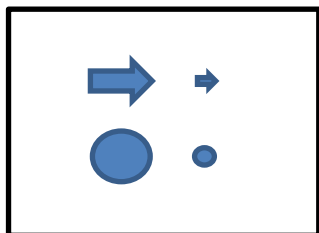
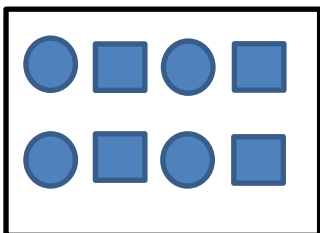
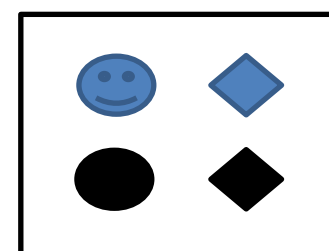
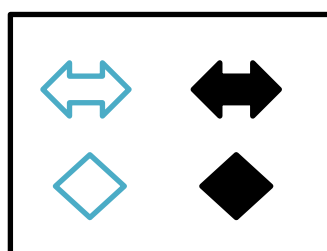
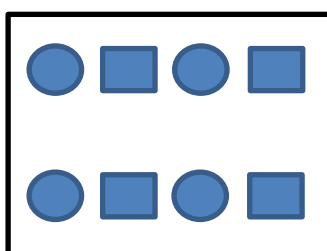
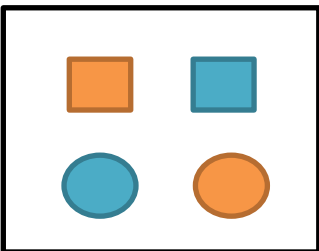
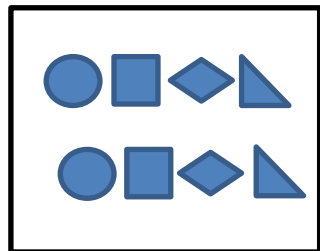
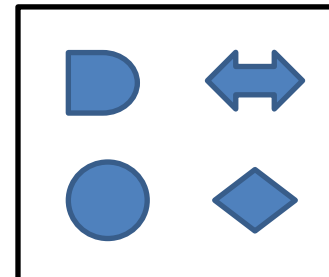
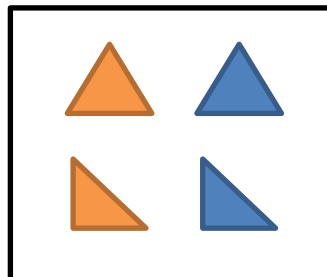
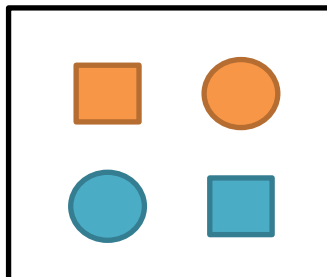
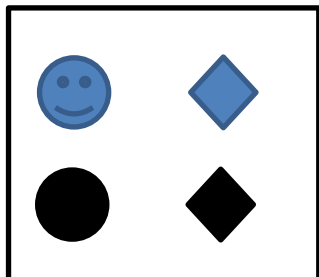
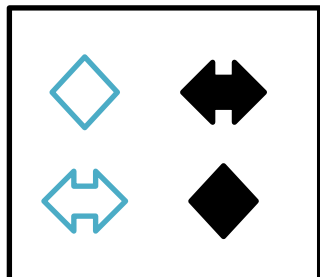


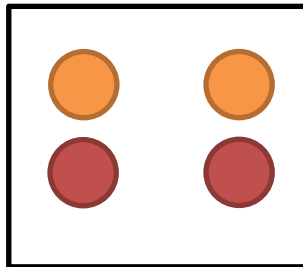
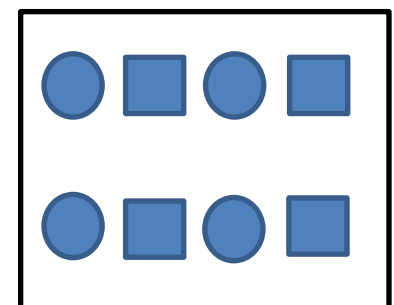
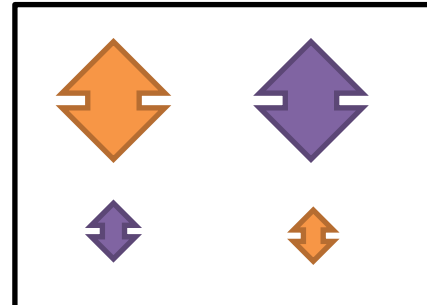
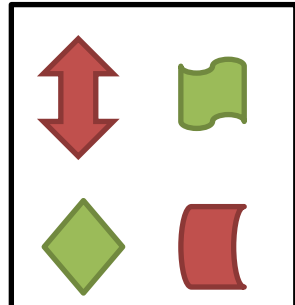
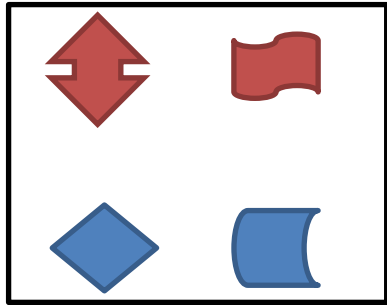
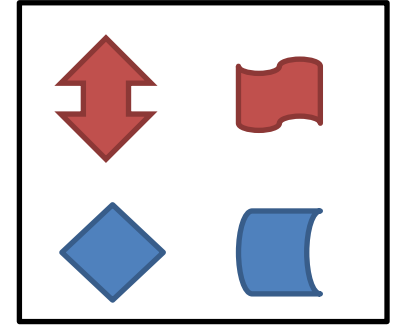
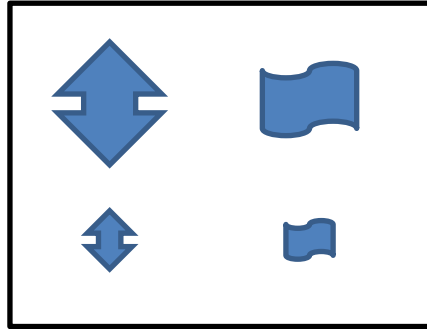
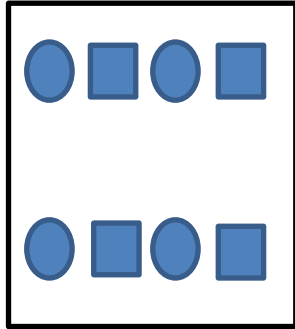
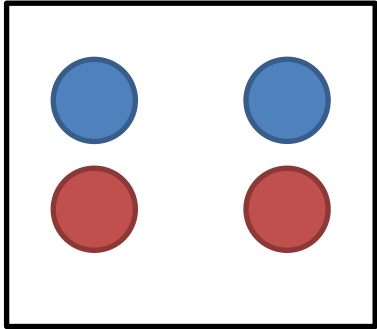
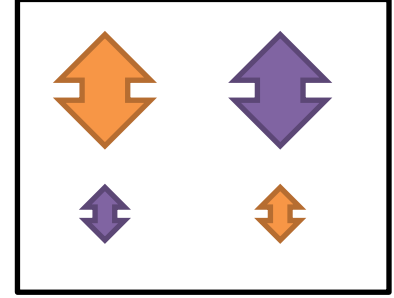
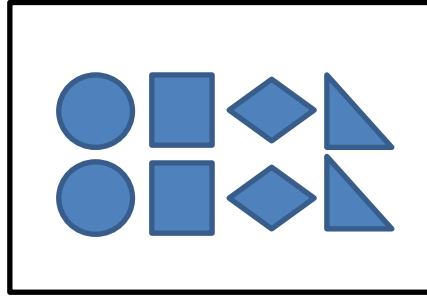
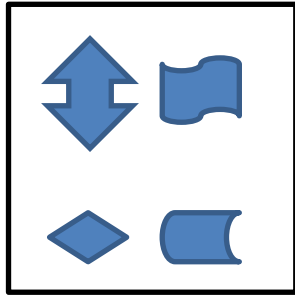
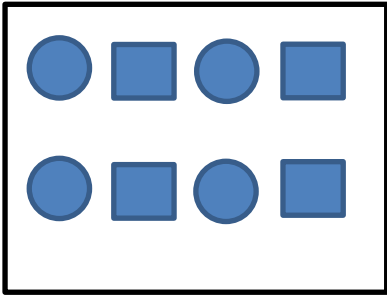
# Survey Results





# Image Set





# Conclusion

- Analysed human segmentation biases
- Proximity is the most dominant factor
- Algorithm implemented to identify connected regions in images
- Quantified proximity in images based on size of object and distance
- Extended continuity, colour contrast with proximity in image segmentation code

# References

- Learning to apply Gestalt Laws by Amit Barjatya & Dipendra Kumar Misra & Amitabha Mukerjee 2012
- Image and code used by Dipendra and Amit, 2012
- Book : From Gestalt Theory to Image Analysis: A Probabilistic Approach By Agnès Desolneux and Lionel Moisan
- Dejan Todorovic (2008) Gestalt principles. Scholarpedia, 3(12):5345
- Learning a Classification Model for Segmentation, Xiaofeng Ren and Jitendra Malik (2003)
- Grouping by proximity and multistability in dot lattices, Michael Kubovy' and Johan Wagemans (1995)