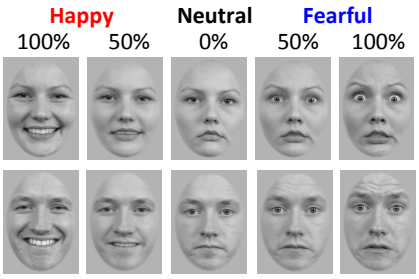
Motion makes fearful facial expressions more detectable

Louise S. Delicato, J. Routledge & D. Williams
Department of Psychology, University of Sunderland, United Kingdom

Introduction

- Facial expressions are rarely, if ever, static in the real world.
- There is mixed evidence about the importance of dynamic signals. Some research suggests an advantage for recognising dynamic expressions[1], while others find an advantage for static expressions[2].
- We need to know how important the rate of change is for our ability to recognise dynamic facial expressions.
- We also need to know whether the affect conveyed by the expressions (e.g. happy or fear) affects the importance of dynamic signals.

Stimuli



- Images generated using 2 Actors (1 male and 1 female) from Radboud Face Database[3]
- Edited using Adobe Photoshop CS5
- Matched average mean luminance of images
- Elliptical marquee removes hair and ears
- Norrkross Morph X used to generate images with different signal strengths (0 - 100%)
- Presented using a Mac Pro on a Samsung SM2233RZ 22" LCD monitor (refresh rate = 120Hz) using Matlab 7.7.0 and Psychtoolbox routines

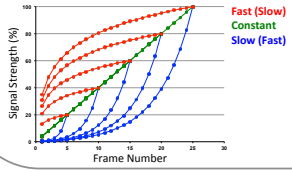
Methodology

Experimental Conditions

Three dynamic conditions:

1. **Fast (Slow)** where the rate of change of the signal strength is fast at stimulus onset and then reduces
2. **Constant** where the rate of change of the signal strength is constant
3. **Slow (Fast)** where the rate of change of the signal strength is slow at stimulus onset then increases

A **static** control condition



Task

- Temporal two-interval forced-choice paradigm
- Method of constant stimuli
  - Signal of **static** comparison stimulus (50%)
  - Signal of test stimulus varied (0 - 100%)
- Maximum signal strength is equal across all experimental conditions
- "Which interval contained the image with the greatest expression?"
  - First or second (single click or double click of mouse respectively)

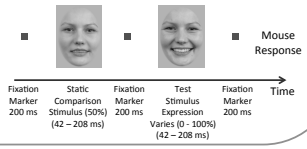
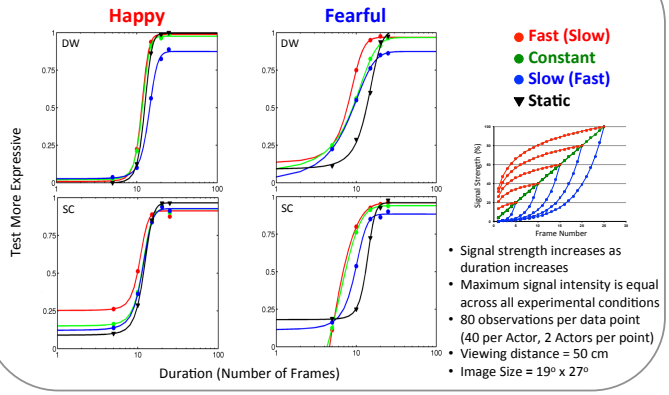
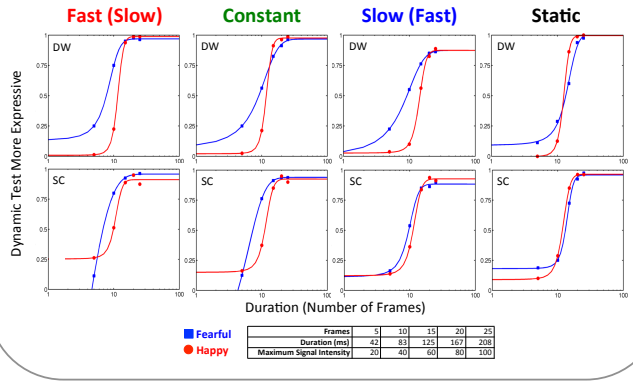


Figure 1: Effect of Motion on Discrimination



- Signal strength increases as duration increases
- Maximum signal intensity is equal across all experimental conditions
- 80 observations per data point (40 per Actor, 2 Actors per point)
- Viewing distance = 50 cm
- Image Size = 19° x 27°

Figure 2: Comparison of Happy and Fearful Expressions



Summary of Results

- As duration increases participants' perception changes from reporting the static comparison stimulus as having the greatest expression to the dynamic test stimulus as having the greatest expression. This change occurs for both Happy and Fearful expressions and all experimental conditions (see Figure 1; Fast (Slow), Linear, Slow (Fast) and Static).
- There is little difference in the curves representing Happy expressions indicating that there is little or no effect of motion on the ability to discriminate Happy expressions.
- For Fearful expressions, curves that represent faster rates of change are shifted to the left of those representing slower rates of change, or static, expressions. This indicates that motion facilitates the ability to discriminate fearful expressions.
- Participants are more sensitive to Fearful compared with Happy expressions when there is motion in the expression. There is no advantage for Fearful expressions when the expressions are static.

Discussion

- We show that motion facilitates the discrimination of Fearful expressions.
- Motion does not facilitate the discrimination of Happy expressions.
- Participants are more sensitive to Fearful compared with Happy expressions when there is motion in the expression. When expressions are static, this advantage is lost.
- This increased sensitivity to Fearful expressions is not in line with previous findings from our Lab[4,5]. We have previously shown increased sensitivity to Happy compared with Fearful expressions in a detection task using static images.

Future Work

- Understand why there is increased sensitivity to Fearful expressions in some experimental conditions and increased sensitivity to Happy expressions in others.
- Measure the sensitivity to different emotional expressions in clinical populations (SPIEs)

References

1. Fiorentini, C., & Viviani, P. (2011). Is there a dynamic advantage for facial expressions? *Journal of Vision*, 11(3):17, 1-15.
2. Jiang, Z., Li, W., Recio, G., Liu, Y., Luo, W., Zhang, D., & Sun, D. (2014). Time Pressure Inhibits Dynamic Advantage in the Classification of Facial Expressions of Emotion. *PloS one*, 9(6), e100162.
3. Langner. O., Dotsch, R., Bijlstra, G., Wigboldus, D. H. J., Hawk, S. T. & van Knippenberg, A. (2010) Presentation and validation of the Radboud Faces Database. *Cognition and Emotion 24 (8): 1377 – 1388.*
4. Delicato, L. S., Finn, J., Morris, J & Smith, S. (2014) Increased sensitivity to happy compared with fearful faces in a temporal two-interval forced-choice paradigm. *Perception* 43 *ECVP Abstract Supplement, page 75.*
5. Delicato, L. S. & Mason, R. (2015) Happiness is in the mouth of the beholder and fear in the eyes. *VSS Abstract.*

Louise Delicato
For More Information
SPIEs