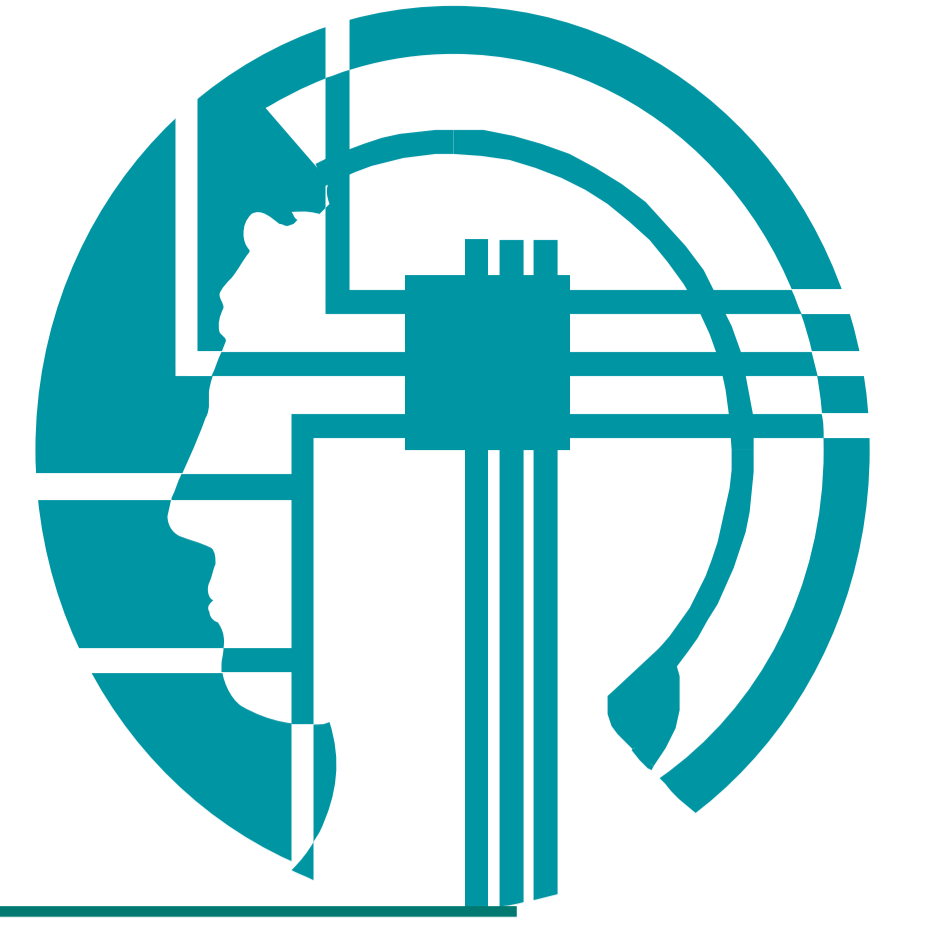




# Characteristic Facial Motion influences Identification Performance

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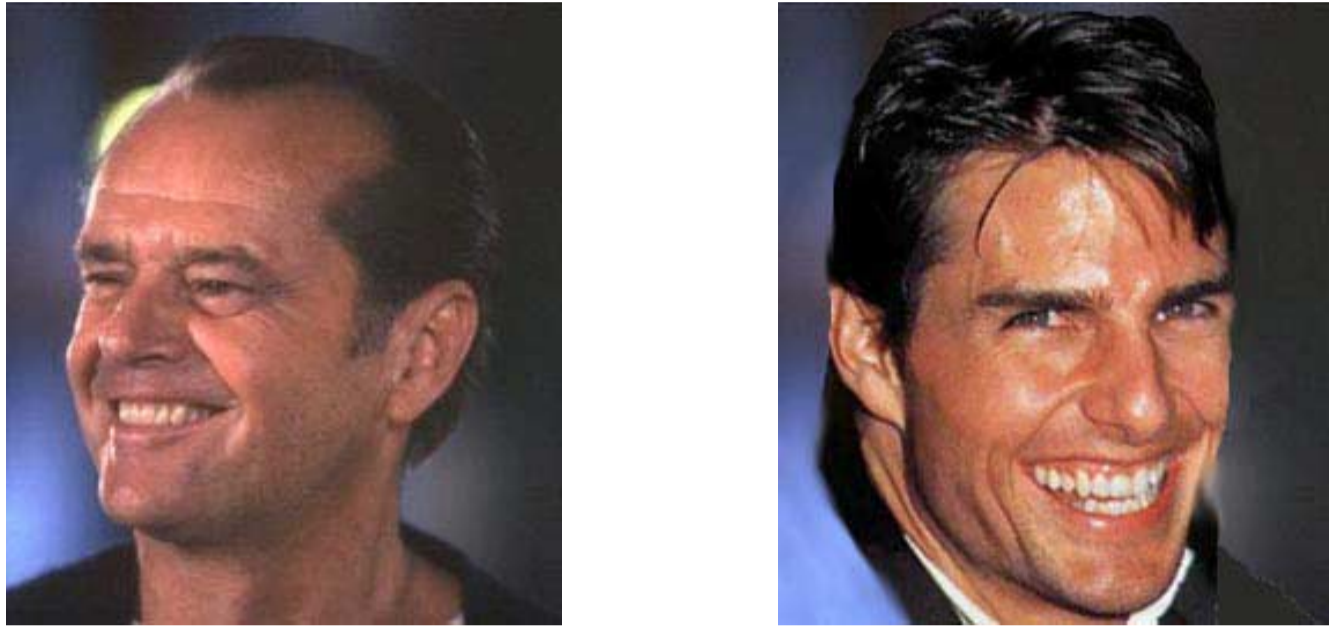


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## Introduction

Could you recognize Jack Nicolson or Tom Cruise by their smiles?



Would you realize, if Tom Cruise smiled like Jack Nicolson or vice versa?

Idea:

Combine shape and motion information of individual faces independently.

Would there be a conflict, if face A was animated with face B's motion?

Aim:

Investigate the relative importance of motion versus shape/texture information in face perception.

Hypothesis:

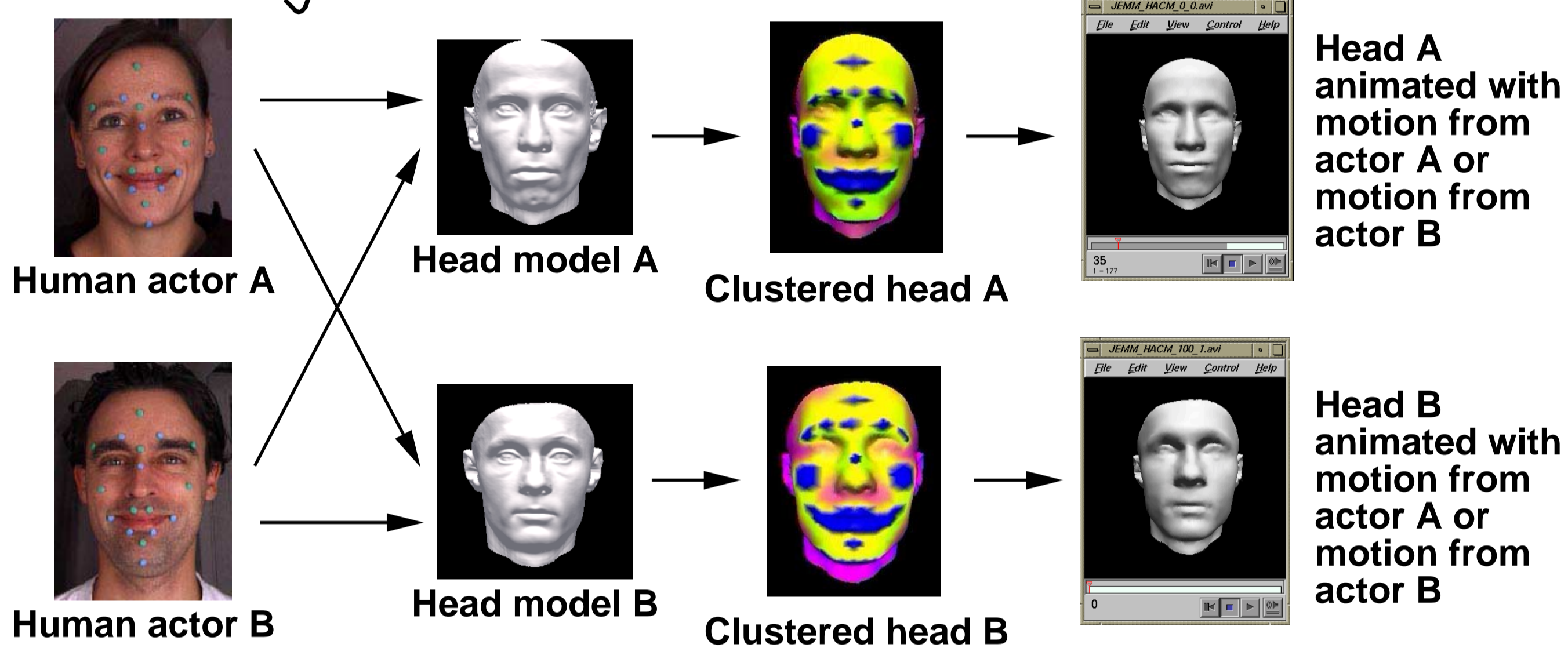
Facial motion might determine identity when shape information is ambiguous.

Background:

It has been shown that facial movement can enhance identification performance or categorization performance for gender and emotions, when the pictures of the faces where somehow degraded, eg. thresholded, negatives or point-light displays (eg. Bassili, 1979; Lander et al., 1999).

## Methods

Animating the heads



Stimuli

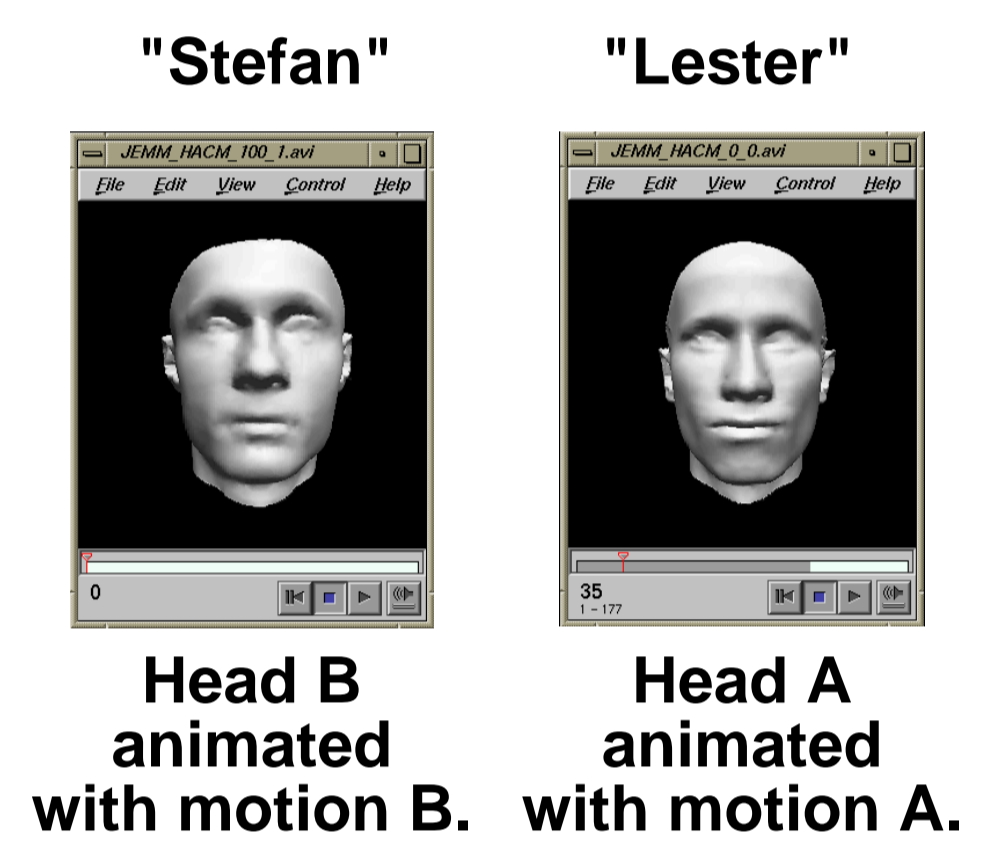
- Each morph of the sequence was animated with facial motions from 2 different male actors to avoid gender effects.
- Both actors were performing the same sequence of facial expressions within the same time interval (10 s). The sequence consisted of 'smile', 'frown', 'chew', 'disgust', 'smile', 'neutral'.

Task

Training

Looped display of the two animated heads for ~30 min. Motions counter-balanced.

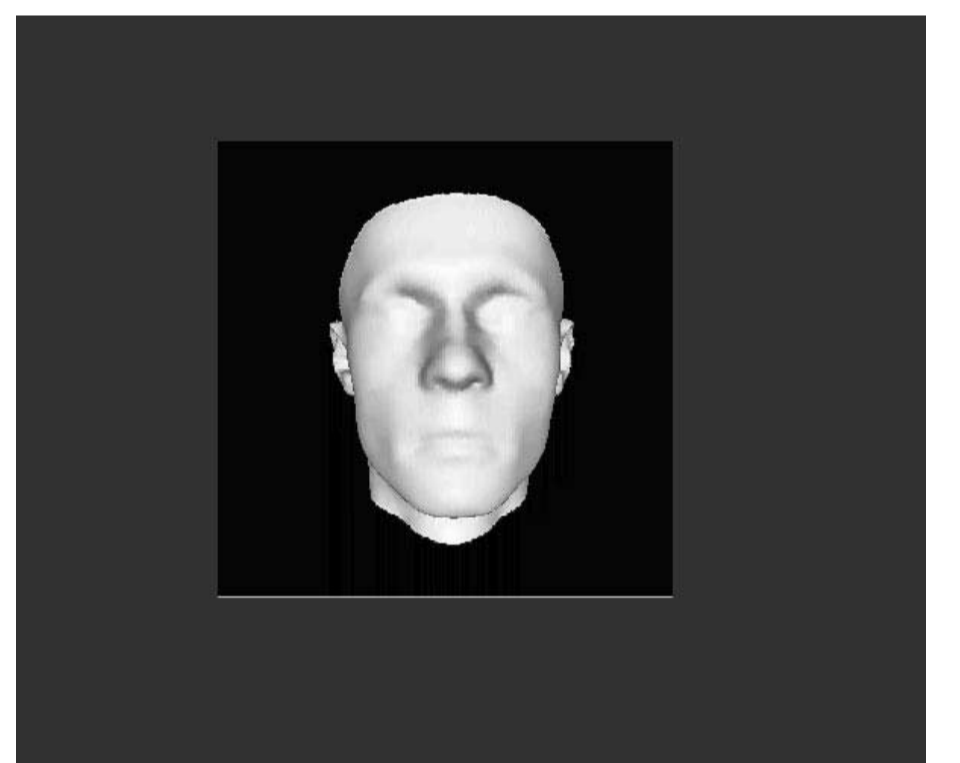
Face rating questionnaire with 6 questions, e.g. "Who seems overall happier to you, Stefan or Lester? Can you say why?" etc.



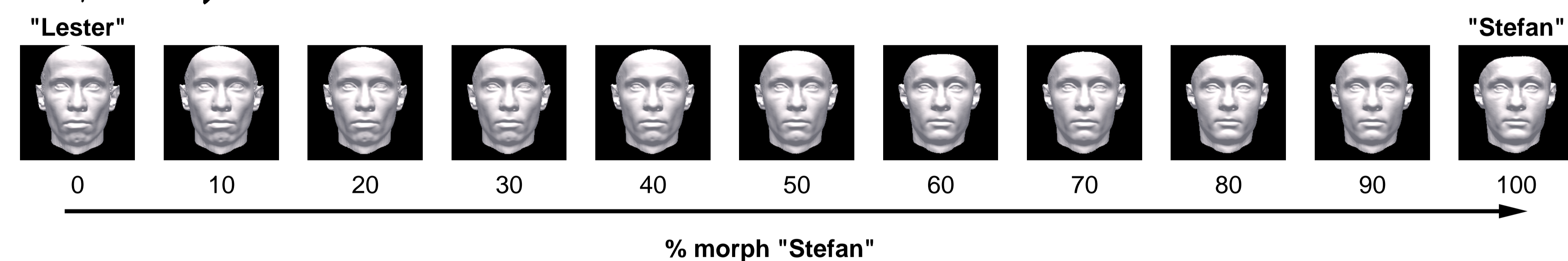
Test

Single display (10s) of the morphed heads either animated with Stefans' motion or with Lesters' motion.

2AFC: "Stefan" or "Lester" ?

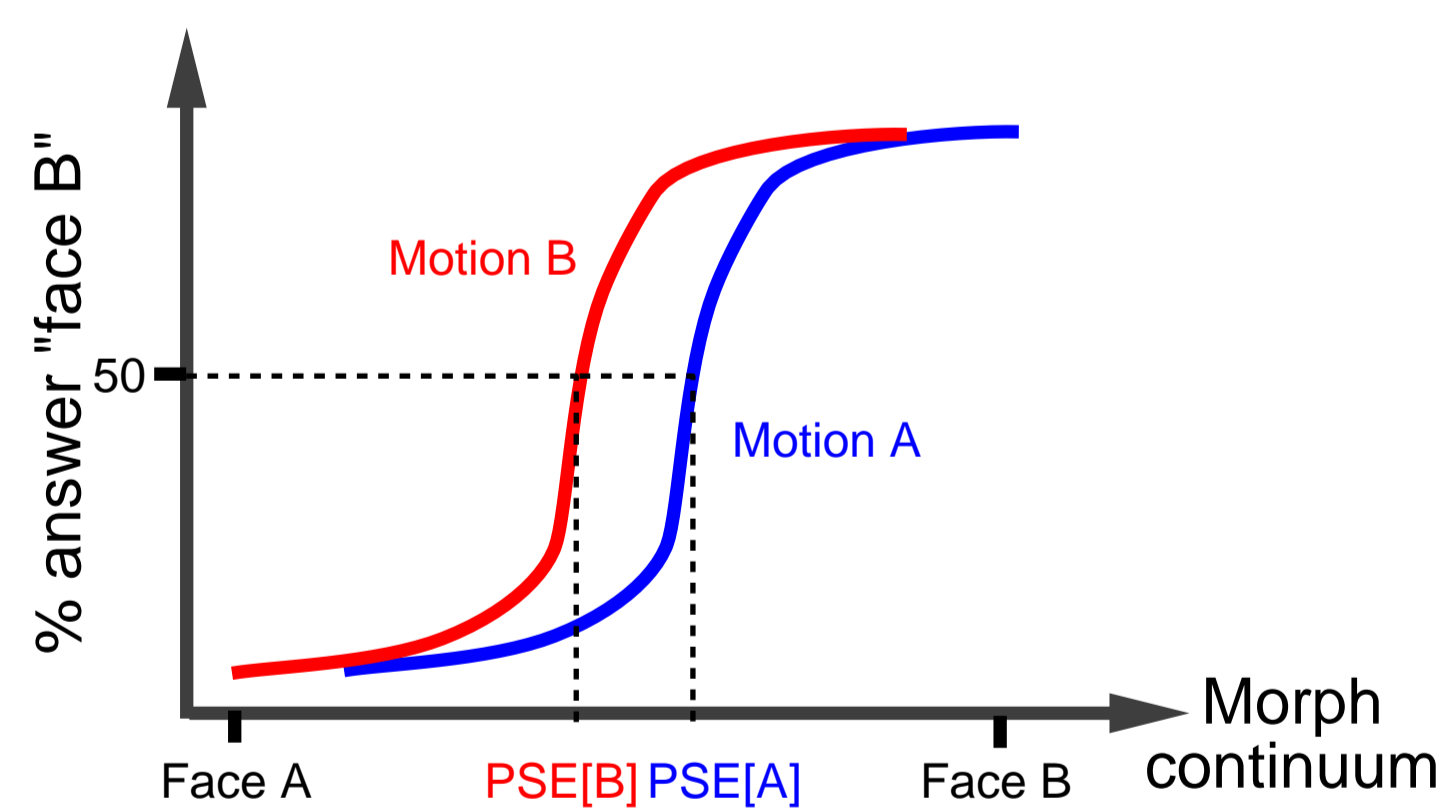


Morph sequence



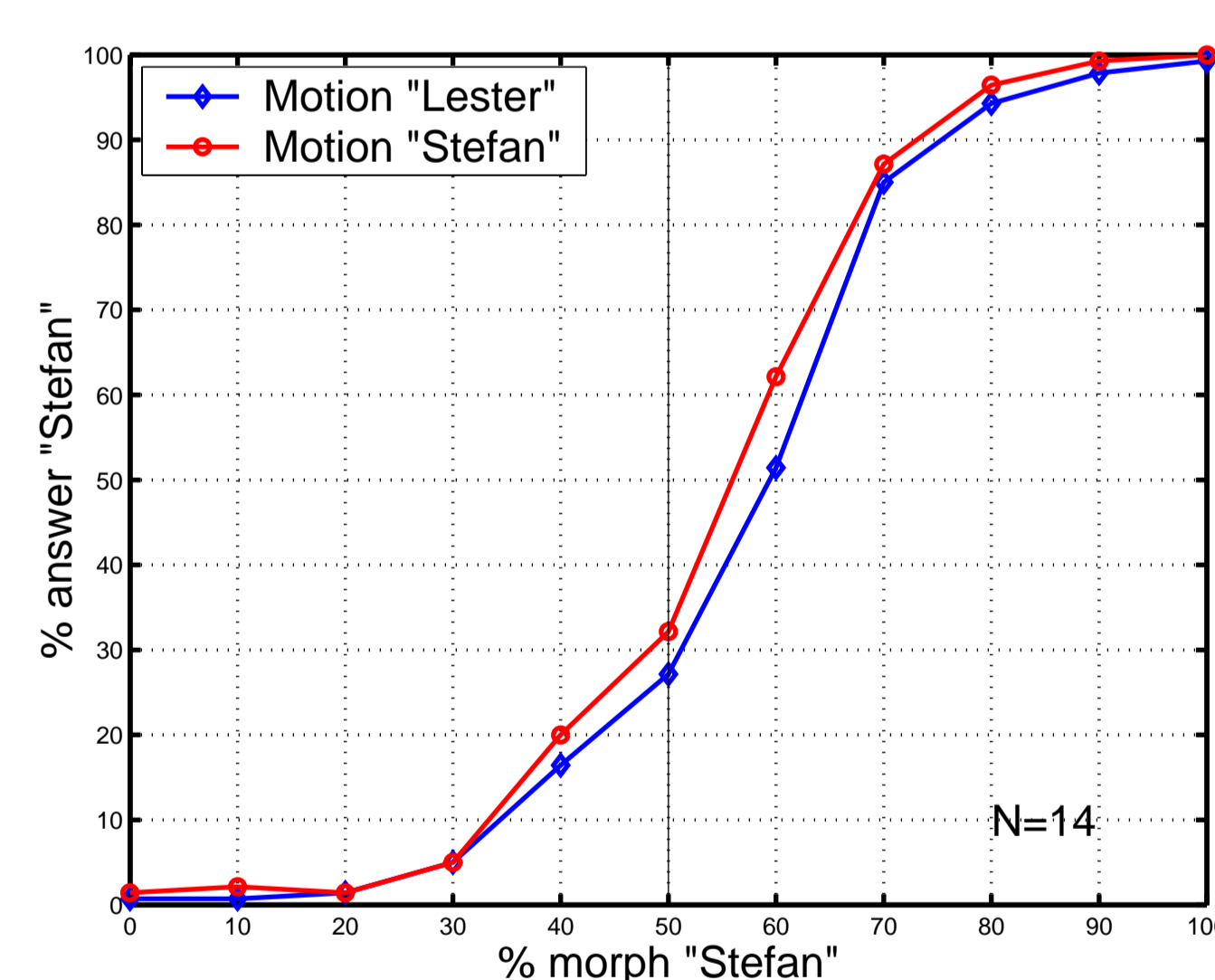
## Results

Prediction



If characteristic motion can be used for identification, then morphs animated with motion B would be labeled "Face B" more often than the same morph animated with motion A. In other words, when animated with motion B, less % morph of face B is needed to get the same response then when animated with motion A,  $PSE[B] < PSE[A]$ .

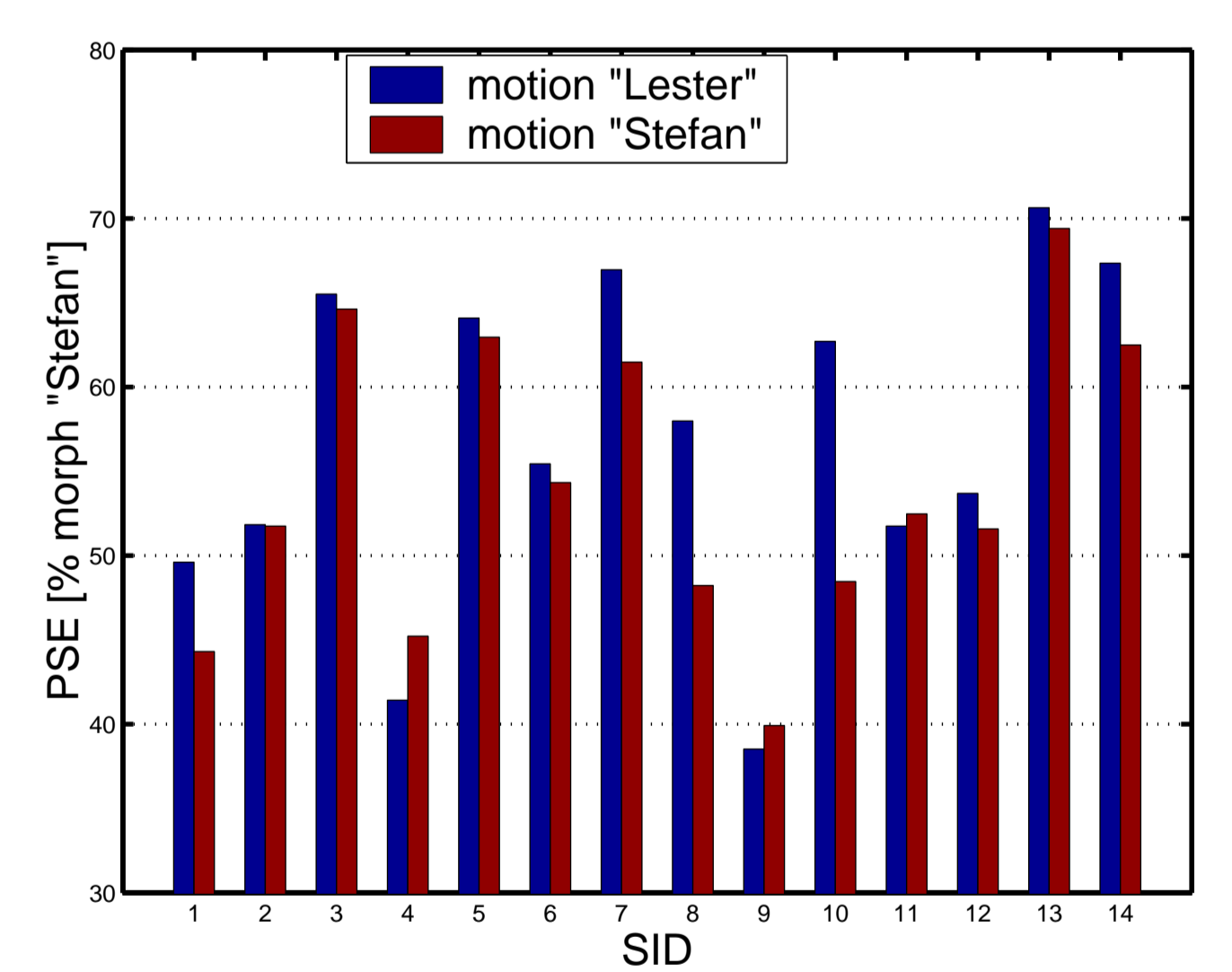
Means across subjects



As predicted, the morphs which were animated with Stefans' motion were more often named as "Stefan" than the same morphs animated with Lesters' motion. This was only true, when shape information was ambiguous, i.e. 30% - 70% morphs.

PSE analysis

Simply averaging across subjects does not take into account that each subject has a different point of subjective equality (PSE). To overcome this problem, a cumulative normal distribution function was fitted to the data for each subject and each motion separately.



The PSEs were significantly smaller,  $t(13)=2.27$ ,  $p=0.02$  (one-tailed), when the morphs were animated with Stefans' motion, than when they were animated with Lesters' motion. Mean of the differences:  $PSE["Lester"] - PSE["Stefan"] = 2.9$  (SE = 1.3).

## Conclusion

☺ If you saw Tom Cruise smiling like Jack Nicolson, you would still recognize the person as Tom Cruise. However, if you saw a face that looked like a mixture between the shapes of Tom Cruises' and Jack Nicolson's faces and that face was smiling like Jack Nicolson, you would more likely name this person as "Jack" than as "Tom".

## What comes next?

- Enhance or reduce shape/texture cues at training (lighting conditions, texture, averaged heads, aperture) → effect drops or increases?
- Make motion more characteristic → Can we ignore the motion? RT?
- Capture motion in 3D & add stereo → Does the effect hold in more realistic settings?
- Facial motion similarity within families?