Development and validation of a new dynamic facial expression database

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Introduction

- Facial expressions are essential for effective communication and social interaction
- Most prior research has used static images of homogenous, highly posed facial expressions
- Our goal is to create a more heterogenous and dynamic facial stimuli database reflecting the expressions seen in the natural world

Development of Stimuli

- 23 actors, 14 female, 9 male
  - 6 African American, 3 Asian, 4 Hispanic, 10 White
  - Age Range 27-71
  - Mean Age 44.22 (±13.87)
- Directed to make different types of facial motion:

EXPRESSIVE	NON-EXPRESSIVE
Angry	Neutral
Disgust	Counting
Fear	Chewing
Happy	
Sad	
Surprised	

- Actors made each expression in 7 different orientations
- Videos were edited to extract 4 sec clips

EXAMPLE STIMULI

Methods

- 10 Participants
  - 7 female, 3 male
  - 50% Asian, 50% White
    - 10% Hispanic
- 1-2 hour computer-based expression recognition and rating task
- Each participant saw all 204 of the front-facing videos
- Asked to identify the expression out of 7 choices or select 'Other' and provide alternate expression

- Rate intensity, genuineness, and valence on a Likert scale of 1-9

- Participants were given a break every 15 videos to rest their eyes

Observer Results

Expressive Facial Motion

Intended Expression \ Perceived Expression	AN	DI	FE	HA	SA	SU	NE	OT
AN	68.2%	18.2%	3.2%		1.8%	3.6%	0.5%	4.5%
DI	5.3%	86.5%	1.9%	1.4%	1.0%	2.9%	0.5%	0.5%
FE	0.9%	4.1%	58.2%		2.3%	34.1%	0.5%	
HA		0.5%		97.7%		0.9%	0.5%	0.5%
SA	2.7%	7.3%	2.3%	5.9%	69.1%	0.5%	5.0%	7.3%
SU			0.5%	26.5%		73.1%		

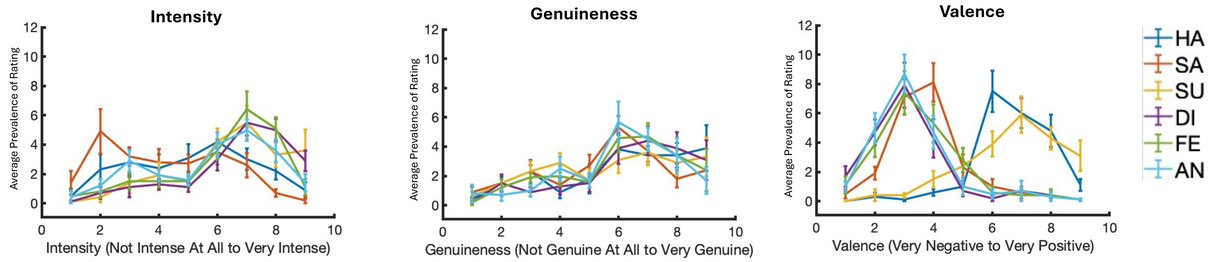
- Good overall correspondence between perceived and intended expressions
- Happiness and Disgust videos well recognized
- Fear sometimes perceived as Surprise, while Surprise sometimes perceived as Happiness

Non-Expressive Facial Motion

	NE	CO	CH	AN	DI	FE	HA	SA	SU	OT
NE	84.9%			6.6%	0.5%		2.8%	2.4%	0.5%	2.4%
CO		85.5%		10.6%	1.0%	0.5%	0.5%	1.0%	0.5%	0.5%
CH			81.2%	6.0%	2.8%		6.4%	1.8%		1.8%

- Non-expressive videos sometimes perceived as Angry

Observer Results

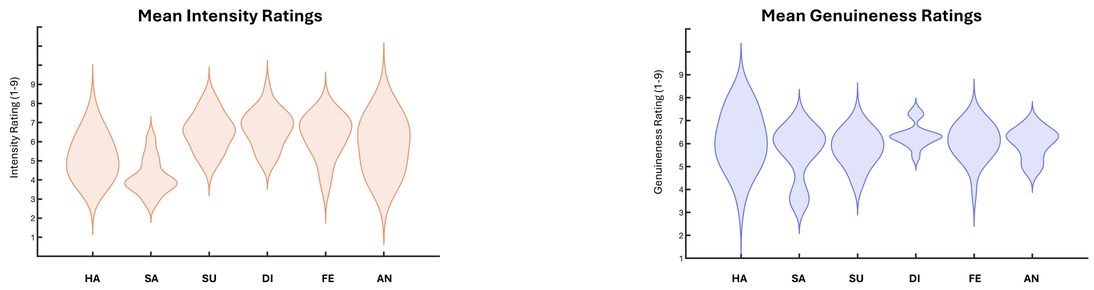


Sadness rated lower in intensity than other expressions

All expressions mostly rated as medium to highly genuine

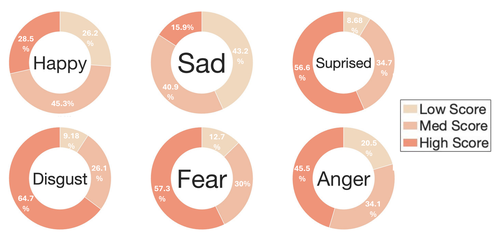
Valence ratings as expected for all expressions

Actor Results

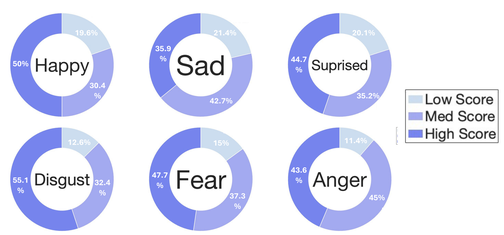


Actors showed similar spread in intensity ratings except for happy and sad expressions

Actors showed similar spread in genuineness ratings except for expressions of disgust



Most actors rated high on Intensity except for happy and sad expressions



Most actors rated as high on genuineness except for sad and angry expressions

Conclusions

- While most videos were perceived as depicting the intended expression, fear was sometimes perceived as surprise, and surprise as happiness
- Variability in recognizability, genuineness, and intensity across expressions and actors

Future Directions

- Further analyze variability across actors and expressions
- Analyze videos in other orientations
- Use pre-trained neural networks to identify expressions and compare to human judgements
- Share videos and associated data with other researchers