OPEN ACCESS

ARVO Annual Meeting Abstract | September 2016

Improving face recognition in age-related macular degeneration via caricaturing

Jo Lane; Nick Barnes; Xuming He; Rohan W Essex; Ted Maddess; Emilie Rohan; Tamara Gradden; Jan Provis; Elinor McKone

Author Affiliations & Notes

Jo Lane
Research School of Psychology, Australian National University, Canberra, Australian Capital Territory, Australia
Australian Research Council Centre of Excellence for Cognition & Its Disorders, Australian National University, Canberra, Australian Capital Territory, Australia

Nick Barnes
National Information and Communication Technology Australia (NICTA), Canberra, Australian Capital Territory, Australia
College of Engineering & Computer Science, Australian National University, Canberra, Australian Capital Territory, Australia

Xuming He
National Information and Communication Technology Australia (NICTA), Canberra, Australian Capital Territory, Australia
College of Engineering & Computer Science, Australian National University, Canberra, Australian Capital Territory, Australia

Rohan W Essex
Australian National University, The Canberra Hospital, and Academic Unit of Ophthalmology, Canberra, Australian Capital Territory, Australia
John Curtin School of Medical Research (JCSMR), Australian National University, Canberra, Australian Capital Territory, Australia

Ted Maddess
John Curtin School of Medical Research (JCSMR), Australian National University, Canberra, Australian Capital Territory, Australia

Emilie Rohan
John Curtin School of Medical Research (JCSMR), Australian National University, Canberra, Australian Capital Territory, Australia

Tamara Gradden
Research School of Psychology, Australian National University, Canberra, Australian Capital Territory, Australia

Jan Provis
John Curtin School of Medical Research (JCSMR), Australian National University, Canberra, Australian Capital Territory, Australia
Medical School, Australian National University, Canberra, Australian Capital Territory, Australia

Elinor McKone
Research School of Psychology, Australian National University, Canberra, Australian Capital Territory, Australia
Australian Research Council Centre of Excellence for Cognition & Its Disorders, Australian National University, Canberra, Australian Capital Territory, Australia

Footnotes

https://iovs.arvojournals.org/article.aspx?articleid=2559046
Commercial Relationships: Jo Lane, None; Nick Barnes, None; Xuming He, None; Rohan Essex, None; Ted Maddess, EyeCo Pty Ltd (I), nuCoria Pty Ltd (F); Emilie Rohan, None; Tamara Gradden, None; Jan Provis, Scientific Advisory Board, Eyeco (C); Elinor McKone, None


Abstract

**Purpose**: Patients with age-related macular degeneration (AMD) have difficulty recognising faces and facial expressions. We examined if this could be improved using an image enhancement procedure derived from high-level cortical coding of faces in a perceptual 'face-space', namely caricaturing. Caricaturing exaggerates the ways in which the shape information in an individual face differs from the average. We tested whether caricaturing would improve face identity perception in AMD patients, and facial expression recognition in a simulation of AMD (normal-sighted young adults shown blurred faces).

**Methods**: To test identity perception, 12 Caucasian AMD patients (mean age 81, range 67-92, 8 females) with mild through severe stages of AMD performed a rating task using monocular vision. Using four levels of caricaturing (0, 20, 40 and 60% exaggeration), and 26 young adult Caucasian faces, participants rated how different two people's faces appeared when compared in pairs. To test expression recognition, 45 Caucasian normal-sighted undergraduates (mean age 22, 36 females) labelled expressions (as happy, sad, anger, fear, disgust, surprise) using two blur levels (50 and 70) to mimic the appearance of different severities of AMD and four levels of caricaturing (0, 40, 80, 100% exaggeration).

**Results**: For identity, a total of 19 eyes were included in AMD patients with visual acuities (VA) ranging from 6/6 to 6/360. Analysing individual eyes, a significant caricature advantage (at p<.05) was seen in 9/9 (100%) eyes with mild AMD (6/6 to 6/15), 3/6 (50%) eyes with moderate AMD (6/24 to 6/30), and 2/4 (50%) eyes with severe AMD (6/75 and 6/360). No change with caricaturing was found for one patient (both eyes; VA 6/19 and 6/24) and in 3 individual eyes (6/60, 6/120 and 6/360). For expression, caricaturing significantly improved expression recognition (at p<.01) at both blur levels
(simulating approximately moderate and severe AMD) with accuracy improved by approximately 7% (e.g., for severe blur, 44% correct in expression labelling without caricaturing, 51% with 100% exaggeration).

**Conclusions**: Caricaturing can significantly improve perceived differences in facial identity in patients with mild AMD and some patients with moderate and severe AMD. It also significantly improves expression recognition in simulated AMD conditions with normal-sighted young adults, suggesting it should also be useful for expression recognition in patients.

This is an abstract that was submitted for the 2016 ARVO Annual Meeting, held in Seattle, Wash., May 1-5, 2016.

This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License.