Faces as Content

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ABSTRACT

This paper describes our position in relation to issues of 'faces as content'; content that really 'matters' to people. Faces convey so much, yet mediation can disrupt these subtle signals. We discuss the social, identity and emotional judgements made of the face and then consider the often-disruptive effect of mediation on these signals. Finally, we describe how faces should be mediated smartly, to mitigate the worst of these.

Keywords

Faces, mediation, thin-slices, face recognition, emotion

INTRODUCTION

Facial content is content that 'matters' to people; from family photos and films, to videoconferencing and games. Faces rapidly communicate a host of complex and subtle messages, about identity, emotion and social signals. A loved-one is brought to mind by a photograph in ways that their name does not evoke.

Today services can now be delivered on a variety of network-enabled devices from smart phones, wristwatches and games consoles to desktop computers. These devices are typically used in different contexts, with quite different interaction styles, having different computational, communicational and display abilities. As such content must be rendered appropriately for each. However, we believe that this can often subtly alter cues and change the perception of the face and person quite dramatically.

This paper describes the signals that faces convey, how common mediations can change these signals and how we might mediate faces smartly with predicable perceptual outcomes.

JUDGEMENTS OF THE FACE

In seeing a face we cannot help but make identity, emotional and social judgements about that person and judge their attention and intentions [11]. This is generally subconscious and instantaneous. Individual biases of the perceiver will also have an influence.

Most psychologists agree that processing facial imagery is a separate and likely specialised cognitive function, in contrast to everyday objects and scenes. As such, there is a body of research demonstrating conditions resulting in an impairment of understanding faces, but not non-faces [7][14][22].

Identity Judgements

We can normally distinguish the stranger from the friend and accurately attribute their race, gender and age.

Emotional Judgements

We use facial expressions to help judge the emotional state of the person [12].

Social Judgements

"Thin-slicing" refers to our ability to make spontaneous social judgements of another's behaviour, in many circumstances these have been shown to be quite accurate [1]. For instance making judgments about their health and competence.

Other aspects of social identity can be communicated through hairstyle and decoration such as clothing, eyeglasses, jewellery, make-up or tattooing [11].

Attention and Intention

In face-to-face dialogue eye gaze is crucial in reading the other's attention and intentions [2][4]. For instance listeners look at a speaker to read expressions but also to indicate attention and regulate turn taking.

Individual Biases

A body of psychological research reports that there are individual biases in the judgement of faces [3][6][8][21]. Of course, recognition depends on an individual having previously seen this face. However, subtler effects have also been observed.

The "own-race face bias" gives an account of the difficulty people experience recognising the faces of an unfamiliar race [6].

Bailenson et al [3] reported that voting intentions could be manipulated by morphing the candidate's face with that of the voter, making them more similar. In addition, that this manipulation was not detected by the voter.

Nass et al [21] studied evaluations communicated by the computer using the participant's own face. Such evaluations were considered to be more valid and objective, than when conveyed by another face. For a viewer's own face the issue of portraiture becomes important [8].

UNDERSTANDING MEDIATION EFFECTS
From a survey of the psychology literature we can begin to catalogue the likely perceptual outcomes given specific manipulations of the content. We consider: scale, motion, colour, orientation, abstraction and synchrony. These manipulations may either operate at a global or local level, changing the entire face or just a feature of it - consider the locally varying distortion of a wide-angle camera lens, versus the global effect of viewing distance.

We have previously considered the manipulations under which recognition is enhanced or impaired [10].

Scale
The scale of a face will often need to be altered to occupy a region of a display. Depending on the viewing distance of the device this will alter its apparent size.

Intuitively recognition of identity degrades with scale, and at a distance we rely more on body language and gait than facial expressions.

We perceive large facial images in similar ways to real faces at small interpersonal distances, according them higher attention, perceived emotional intensity and better memory [16, pp. 37-51].

This has implications for narrative understanding (e.g. watching a film). If characters appear small, we remember them less and thus perhaps have difficulty constructing and following the plot.

Motion
Some interfaces demand moving faces, whereas others use static images.

Studies have shown recognition rates improve for moving faces, Lander and Chuang [15] report that motion is most salient for distinctive nonrigid motion (talking, expressing) of those of whom we are highly familiar. Therefore for recognition, characteristic motion should be introduced where possible.

Recognition of emotion may also be compromised. Schiano [19] suggests a need for high-fidelity representation of motion, even at the expense of spatial resolution.

In video conferencing, Reeves and Nass report that decreased video frame-rate can be interpreted as the clumsiness or incompetence of the other person [16, pp 212], where this may only be a symptom of network congestion.

At low frame rates, our ability to detect deceit may be diminished. Paul Ekman describes the existence of Micro-expressions [12], fleeting expressions lasting less than a 15th of a second, that give away our true intentions. At coarse time resolutions these expressions may be missed entirely allowing liars to go undetected.

Colour
Faces will be displayed with a reduced or manipulated colour palette to match the display's capabilities, the service style, bandwidth, computational memory etc. We suggest that these judgements can be influenced by mediation, rather than individual choice or knowledge.

Colour is an important cue for face recognition which when removed impairs performance [10], but it also influences social judgements. Zebrowitz describes how the pallid face can be read as "physically weak" and a florid complexion as a "dissolute" character [23]. Anecdotally this is supported by English phrases such as "green around the gills" and "deathly pale" which suggest the importance of facial colour in judgements of health.

Russell has shown that the local luminance level of the eyes and mouth to the rest of the face, influences judgements of attraction [18]. For women, higher ratings of attraction were found where the contrast of the eyes and mouth were increased, for men the opposite was found. This is consistent with common uses of make-up.

The greying of the hair and the visibility of wrinkles are key signs of ageing. Burt showed that local changes in texture do have an effect on the perception of age, but global increases in contrast do not [9].

Orientation
In consumer situations, the physical arrangement of cameras and displays is likely to vary from site to site. In addition aligning a camera behind the eyes of the projected face is nearly always impossible. As a result, eye gaze is offset.

Absence of eye contact may be misread as absence of attention, when it is simply a product of the camera and screen placement.

Geometrical arrangements of people can also influence social behaviour. If one party in a videoconference appears "taller" then they tend to dominate the conversation [13].

Abstraction
For video coding purposes, or in an attempt to create a particular visual style to the experience, participants may be abstracted from natural video.

Where participants are for instance represented as avatars we may experience a sense of the "Uncanny" [5] where the

cues from appearance and behaviour indicating human life don't quite match.

McCloud notes that as faces become more iconic they lose their objective identity and take on more the subjective identity that the viewer chooses to give them [20].

Synchrony

Asynchrony between audio and video frequently occurs due to unpredictable delays in transmission and decoding technologies.

When asynchrony between lips and speech occurs, viewers judge speakers more negatively [16, pp. 211-218]. Worryingly, most viewers don't even notice this happening and so would be unable to make conscious corrections.

MEDIATING FACES 'SMARTLY'

We have argued that from faces judgements of identity, emotion, social behaviour, attention and intention are read, often subconsciously. We have suggested how common mediations of faces can distort these judgements and cited supporting work where available. There is clearly much work to be done in cataloguing the effects of mediation on the face and this research needs to continue. However, once this is more completely understood, we need to consider how mediated communication systems should mitigate these distortions.

Our current work is concerned with recognition and how this may be maintained across devices and services [10]. In order to deliver the most recognisable face we must model every aspect of the system; the user, the context and the constraints associated the device and network. The face can then be rendered to maintain recognition within these constraints, using techniques such as cropping, caricature and sketching. This is in line with the architecture proposed by Russ et al. [17].

Our future direction is to develop models that predict perceptual consequences of coding strategies with face content and to develop alternative techniques to mitigate the worst of these. For instance if frame rates suggest a perception of clumsiness, we could reduce the frame rate further so that the cause of the problem is attributed correctly to the system and not the person. As Reeves and Nass comment, "making media do less than they can, rather than do all they can, sometimes works better." [16, pp. 217]

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