Emotion Researcher

The Official Newsletter of the International Society for Research on Emotion

THE GREAT EXPRESSIONS DEBATE

In this issue of Emotion Researcher, three major research programs in the study of facial expressions finally tackle one another in a landmark debate. Do not miss the face off between Dacher Keltner and Daniel Cordaro (Basic Emotion Theory), Alan Fridlund (Behavioral Ecology View) and Jim Russell (Psychological Constructionism).

Editor's Column

Click on the post's title to get a preview of what's inside. There is much to enjoy in this issue, which marks another step forward in ER's transition from printed newsletter to online reference resource. Enjoy and keep in touch!

An Interview With Phoebe Ellsworth

Read an interview with Phoebe Ellsworth, one of the world's leading affective scientists. Phoebe discusses how she became a pioneer of appraisal theory, and what affective science needs moving forward (in the picture, Ellsworth is surrounded by students at the 2015 PhD party for Patricia Chen)

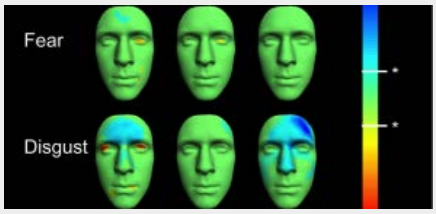
ISRE 2015: Report

Check out David Sander's report on ISRE 2015 in Geneva (July 8-10). ISRE was a smashing success, with 500 participants from 33 countries and 380 scientific communications over three days of international and interdisciplinary conferencing. Do not miss the pictures from the conference!

In Memoriam

This year, we have sadly lost Nico Frijda and Carolyn Ingrid Saarni. Read Batja Mesquita's memories of NIco, and Heather Roller's memories of her mother Carolyn.

Spotlight



The recipient of this issue's Young Researcher Spotlight is Rachael Jack, a researcher on facial expressions from the University of Glasgow.

ISRE Matters

Check out Arvid Kappas' latest column. ISRE's President discusses three key moments in the history of facial expression research.

Editor's Column

Andrea Scarantino, Philosophy and Neuroscience Institute, Georgia State University

August 2015 – ISRE 2015 in Geneva was great. David Sander and his collaborators did a really good job putting together a top-notch program, which featured excellent keynotes, symposia, individual talks and posters by household names and young scholars from all over the world. I especially enjoyed touching base with many friends and colleagues in the welcoming setting of the Bastions campus, and being exposed to the latest research in a variety of disciplines. I learned a lot not just from the talks, but also from informal conversations I had throughout the conference.

I remember with special fondness an afternoon chat with Phoebe Ellsworth, Ira Roseman, and Agnes Moors in the shadows of a big tree on whether appraisals are causes of emotions, or just entailed by them. If only emotion research could always be this fun! ISRE 2015 confirmed the state of ebullient vitality of our field, the central importance emotions have acquired in the sciences of mind and the humanities alike, and the proud interdisciplinary nature of our society.

Geneva as a city gave us a warm welcome, in more ways than one. I won't forget the lake, the old streets, the stately buildings, the lovely street cafes' and the unique thrill of the $12 sandwich and the $24 pasta dish. Ah, the memories! You can read a report on the conference here by David Sander himself (check out pictures from the event at the bottom of David's report, and send me missing captions and extra pictures!).

This issue of *Emotion Researcher* focuses on one of the hottest topics in contemporary emotion theory: facial expressions. As you will see, the contents of this issue mark another step forward in the transition of ER from printed newsletter to online reference resource. ER is in effect becoming an *Online Affectipedia With News, Brought To You By ISRE.* A one-stop shop where you can go to get not only news about our society, but, most importantly, up-to-date and interdisciplinary overviews on central topics in emotion theory by some of the best people in our field.

Over the past two years, the ER has been exploring a number of possibilities for bringing you top-of-the-line research, including interviews, self-presentations, Q&As and self-standing articles. What we had not had so far was a debate. In this issue, we explore this format with a debate between proponents of three research traditions on the study of facial expressions: basic emotion theory, the behavioral ecology view and psychological constructionism.

Over several months, I have worked with Dacher Keltner and Daniel Cordaro, Alan Fridlund and Jim Russell to put together a debate on the nature of facial expressions. This is the first time in my memory that opposing research camps in the study of expressions face one another openly in a debate setting, and explore areas of agreement and dissent on the thorniest issues of emotion expression research.

I found out why these sorts of debates do not happen more often: they are damn hard to execute! Most importantly, they require the participation of scholars who are not afraid to engage with one another in the risky business of giving and asking for reasons. The patience, openness and intellectual firepower of the four debaters that accepted to be part of what I would like to call the *Great Expressions Debate* truly impressed me. I could not be more grateful to them for all the efforts they put into this exchange, which in my view should become required reading moving forward for anyone interested in facial expressions.

As you will see, the debate did not settle all differences (far from it!), but it revealed that there are significant and in some cases surprising areas of agreement even between fiercely opposed research camps. And where agreement was not found, it is now much clearer why, since some of the central sources of disagreement – some technical,

some methodological, some substantive – have been brought to the surface and made explicit.

The debate was organized as follows. First, each group formulated a manifesto piece summarizing one's favorite research program on emotional expressions. You can read Keltner and Cordaro's manifesto piece here, Alan Fridlund's manifesto piece here, and Jim Russell's manifesto piece here. These are first-rate introductions to three traditions in the study of facial expressions, and they highlight recent developments within each research program.

Then, each debate group sent me some comments on manifesto pieces other than their own. On the basis of such comments and of my own readings of the manifesto pieces, I came up with several questions, some addressed to specific debaters, some addressed to all, and in a few cases offered follow-ups. The resulting debate is tremendously interesting, and possibly a watershed moment in the study of facial expressions.

I really hope you will find the debate as enlightening as I did. I want to thank again Alan, Dacher, Daniel, and Jim for their contributions to the Great Expressions Debate. As you will see, the copyrights of the manifesto pieces and of the debate are retained by their authors, which is a first for the Emotion Researcher. This is because the quality of this exchange was such that it is going to be re-published in modified form by a major academic press that demanded the preservation of copyrights by the authors.

Both the *ISRE Matters Column* and the *Young Researcher Spotlight* are thematically connected to facial expressions, to round up the issue. In his column, Arvid Kappas, who was re-elected President of ISRE this past July in Geneva (congrats Arvid!), takes us on a journey through three eras of facial expression research, and highlights some of the challenges related to teaching an automaton how to show emotions.

The Young Recipient Spotlight goes to Rachel Jack, an up-and-coming young researcher from the University of Glasgow who is doing innovative work on facial expressions by applying to expression research experimental techniques inspired by work in psychophysics. Rachel's research group probes the "receptive fields" of social perception in different cultures by presenting subjects with randomly formed facial expressions, and checking which configurations of the hyperspace of facial variation lead to inferences about emotions and other mental states.

There is yet another treat for you in this Emotion Researcher: an interview with Phoebe Ellsworth, one of the world's leading affective scientists and a real pioneer of appraisal theory. Phoebe traces the history of her outstanding career, sharing wonderful anecdotes about her life in academia, about falling in love with her husband while challenging the constitutionality of death-qualified juries, about the quality of today's social psychology research, and about many other topics of great interest to the emotion community. And do not miss the now customary ER recipe, which is Mussels with Roasted Potatoes!

But not all is good under the stars. This year, we have lost two influential scholars, Nico Frijda and Carolyn Saarni. Nico is remembered by Batja Mesquita here, and Carolyn is remembered by her daughter Heather Roller here. I did not have the pleasure to meet Carolyn, but I met Nico several times at workshops and conferences, and had the privilege of interviewing him for Emotion Researcher (his interview can be read here).

Nico was a profoundly insightful scholar, and an irresistibly charming man. His 1986 book, *The Emotions*, remains to this day a spectacular and perhaps unsurpassed achievement in emotion research. Nico and Carolyn have left us, and they will be sorely missed. But the seeds they have planted will live on, and bloom again. As the poet once said, the song has ended, but the melody lingers on…

As usual, be in touch with comments, ideas for future issues, information about forthcoming conferences, reports about especially promising young researchers, and whatever else strikes your fancy. To whet your appetite, let me also tell you that a new issue of Emotion Researcher is in the works, focused on romantic and parental love. Stay tuned!

Previous Editor's Columns

ISRE 2015: Report

David Sander, Department of Psychology, University of Geneva

ISRE 2015: In the Heat of the Moment

August 2015 – We were extremely pleased to welcome so many affective scientists – from so many countries, disciplines and academic levels – to Geneva for the July 8-10 conference of the International Society for Research on Emotion (ISRE). ISRE 2015 was a great success, and confirmed that emotion research has never been so flourishing. For 3 days of intense conferencing, around 500 participants from over 33 countries met at the University of Geneva. ISRE 2015 offered more than 380 scientific communications, distributed over 3 plenary lectures, 150 symposium presentations, 81 individual talks and 146 posters.

We were proud that the presentations covered so many relevant disciplines including psychology, philosophy, neuroscience, sociology, linguistics, literature, affective computing, history, and anthropology. Participants were 54% females, and mainly came from Europe (around 70% of participants came from 22 different European countries). But the conference also attracted researchers from other continents (e.g, 17% from America, and 7% from Asia). Most participants were graduate students or post-docs: 37% were Master students or Phd students, and 40% were post-docs (early or advanced), with professors representing 23% of the total attendance.

The Geneva conference also confirmed that emotion research is a very hot topic in a different respect: we reached the highest temperature ever recorded in Geneva! In brief, ISRE2015 was multidisciplinary, international, and strongly attractive for the next generation of emotion researchers. It was a unique opportunity to present research, to learn about advances in other disciplines, and to debate emotions from the uniquely interdisciplinary angle that characterizes ISRE.

I would like to deeply thank the ISRE board, and the members of our Scientific and Organizing committees (http://www.isre2015.org/Committees) for their strong involvement in the preparation and actual running of ISRE 2015!

Check out some pictures from ISRE 2015 below (taken by Leonardo Ceravolo, Stephanie Shields, and others)… Email ascarantino@gsu.edu to add missing captions or extra pictures!

Scherer remembers Frijda

Arvid Kappas

Justin D'Arms, blurred

Didier Grandjean and Andrea Scarantino

ISRE Matters – Facial Expressions Issue

Arvid Kappas, Psychology, Jacobs University Bremen, ISRE's President

Face Matters

August 2015 – We are all fascinated with faces. We stare at faces from a very early time in our lives. We imitate facial movements already hours after birth. We surround ourselves with reproductions of faces on our desks, our phones, our computers, our walls. We are obsessed with *selfies* – well, at least many of us are. There are museums dedicated to portraits, and mostly these show faces and not feet or other body parts. Profile pictures show heads and not bellies. Passports and ID cards focus equally on that little ball sized thing that houses our brain, and features some important sensory organs. However, it is not just *any* face we like to freeze in time with our recording devices – we like faces that smile. So much so that some camera manufacturers are now installing smile detecting software that can delay the trigger until a smile has been shown! So what's the deal with the smile then? This issue of the *Emotion Researcher* focuses largely on research on facial "expressions" and. The fascination with emotional faces has played a major role in the development of emotion research at several historical junctures, as I proceed to show. In that sense too, facial expressions are special!

Charles Darwin and Facial Expressions

Clearly, Charles Darwin's masterpiece, *The Expression of the Emotions in Man and Animals* (1872), covers much more ground than facial movements alone, but most people remember vividly the powerful facial illustrations contained in the book. Darwin presented a number of photos of faces and bodies taken earlier in the 19th century by Duchenne de Boulogne, as well as several drawings, also based on Duchenne's work. In fact, the pictures in Darwin's book were at the time a powerful new feature for a science book and they are likely one of the reasons why the book sold very well.

The book Darwin's Camera by Philipp Prodger covers much info on the visuals in *The Expressions* and also includes unpublished photographic material. If you are interested in this angle, I do recommend the book, which also includes many interesting stories about Duchenne, about the fate of the photos etc. But the point I really want to make in this column is that *The Expressions* basically bootstrapped experimental emotion research and moved the scholarly interest in emotions from a largely philosophical context to that of a behavioral science.

The intangible feelings with which emotion science has occupied itself until then were replaced by movements that could not only be observed in the moment and verbally described, but that could, via photography, be frozen in time and studied at leisure. In this way, Darwin shifted the focus by bringing the internal world of emotions to the outside. On the negative side, Darwin's focus on observable expressive behaviors paved the way for the behaviorist revolution that was to haunt psychology a few decades later.

Of course, there are many myths and rumors surrounding *The Expressions* among scholars in the 21st century. Some are disseminated by folks who have quite clearly never read the book, and only rely on secondary or tertiary sources. I highly recommend having a look at the original text, which continues to be seminal for our field. Here is an example among many of Darwin's contemporary relevance. The voice is becoming a real draw for students of expressions, and it was brought into the debate on emotional expressions by none other than Darwin. Consider the fol-

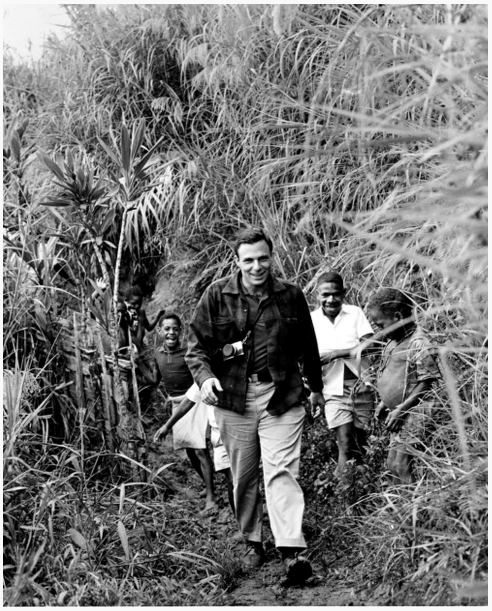
lowing quote from page 93 of the 1872 edition of The Expressions: “As fear causes all the muscles of the body to tremble, the voice naturally becomes tremulous, and at the same time husky from the dryness of the mouth, owing to the salivary glands failing to act.” – a rather modern view integrating, expression, physiology, and acoustics!

Darwin also manifested a profound understanding of the complex and multi-modal nature of expressions. Dacher Keltner counted more than 50 emotional expressions discussed in the book, despite the widely held belief that Darwin had focused only on 6 or 7 emotions. *The Expressions* is mostly about expressive behavior writ large (and the its evolutionary functions and origin), but it also touches on the perception side in the last few pages. It even clearly states a version of the facial feedback hypothesis 100 years before James! This being said, without a pre-existing fascination with facial expressions in the scientific community, Darwin’s book might not have triggered the empirical study of emotions.

Paul Ekman and Facial Expressions

The combined left-right-punch of scientists’ failure to find clear evidence for Darwin’s prediction of universal emotional expressions in the first decades of the 20th century, and behaviorism’s assault on emotion as a mental construct had left emotion research pretty down few decades after the publication of *The Expressions*.

While “appraisal” was a new kid in town with Magda Arnold’s double volume *Emotion and Personality* in 1960, followed by Richard Lazarus’ work on cognitive appraisal, it was arguably Ekman’s work on the universality of facial expressions, inspired by Darwin and Tomkins, that created new interest in facial expressions, nonverbal behavior in general, and finally basic emotions.

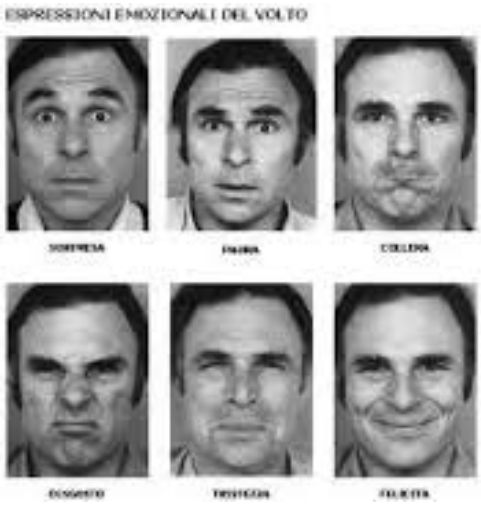


Paul Ekman in Papua New Guinea

Ekman’s work was catapulted to the forefront of emotion research by his classic 1969 *Science* paper “Pan-cultural elements in facial displays of emotions”, co-authored with Sorenson and Friesen. Even though his work would fit into a natural science department, Paul Ekman likes to remind us that his Human Interaction Lab was hosted in a psychiatry department at the Langley Porter Institute, as psychology departments at the time tended to be deeply suspicious of work on emotional expressions.

However, the combination of the new empirical data presented by Ekman and his colleagues, and the methodological innovations made possible by the *Facial Action Coding System* Ekman developed together with his colleague Wally Friesen, really provided motive and method for the renewed interest in facial activity and emotions. It is hard to find a member of the founding generation of ISRE scientists who was not directly or indirectly influenced by this research.

This is not to say that there was no important work on facial behavior and its perception before. For example, ISRE founding member Nico Frijda, who passed away recently, was very much interested in facial expressions, and had a line of research in the 1950s that involved even dynamic expressions – going further than Darwin's illustrations before or Ekman and Friesen's well known static sets decades later. But Frijda's work on faces arguably did not result in as much public attention compared to the mass media appeal of Paul Ekman's work.

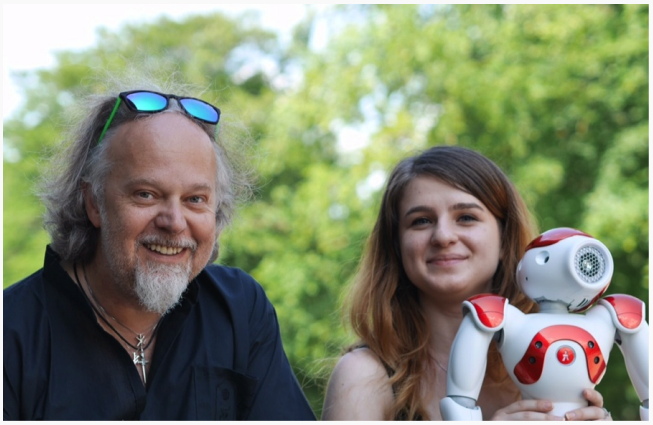


Since the 1970s, there has been fierce debate regarding how many emotions there are, how they are linked to facial or bodily activity, and whether expressions are universal. As the fascinating discussion between Keltner and Cordaro, Fridlund and Russell in this issue testifies, the dust is far from having settled on these topics. Let me lay my cards on the table. My own work on facial expressions has convinced me that no theory can predict *yet who* will show *what* expressions to *whom* in *which condition*. For example, the results of the study by Hess, Banse, and myself 20 years ago suggested that neither Paul Ekman's Neurocultural Theory, nor Fridlund's Behavioral Ecology view can do so at present. But this debate is for another issue, for another conference, for another time. Instead, I want to focus on the third pivoting point in this brief history of how the study of expressions has impacted emotion research. This one is in the here and now.

Affective Computing and Facial Expressions

I am currently involved in a project funded by the European Union on developing empathic robots for use as tutors in a school setting with children (EMOTE). It is one of many projects in the last decade that use facial activity as a clue for an artificial system as to the emotional state of a human. In my view there lies much promise here, but also, I am afraid, much headache and worries.

I tend to describe the challenge, somewhat cartoonesquely, as follows. The engineers ask emotion specialists to describe how many emotions there are and what they look like. The emotion scientist might say: "Well, for example when people are happy they smile. A smile involves action units 12 and 6 according to Ekman and Friesen's FACS." "Great" the engineers say, "we can do that." They go away and come back with some piece of software that can identify AU12 and maybe even the wrinkles around the eyes, as in AU6, and a label pops up that says HAPPY. The emotion scientist says – "ah well, I forgot one thing. Actually, you cannot be sure the person is really happy if they smile. See, they could just be polite … or embarred …or". This is where the engineer generally stops listening. Engineers are allergic to the branching out of theoretical possibilities.



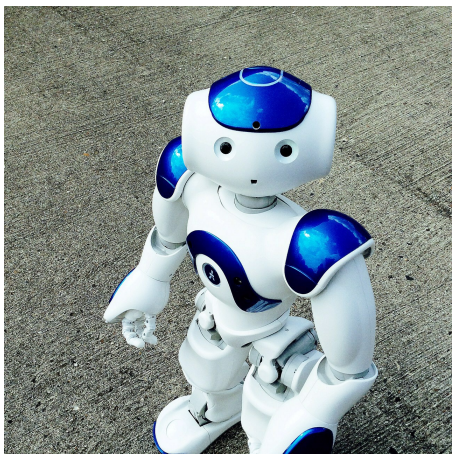
Arvid with his former student Alina Dinu and Nao the Robot

Of course, this is a greatly exaggerated scenario, full of stereotypes. I apologize to my engineer friends if they feel portrayed as simpletons. They are not. The point is that if you had to build an actual robot, you would also prefer straightforward answers to endless disquisitions that make implementation hard to achieve because of all the complexities they raise. The point I want to make here is that the rapidly increasing interest in socially intelligent information and communication technology brings emotion science again to the forefront, but it also raises the bar for it.

Suddenly, there is a new application for emotion science. An application where there is, potentially, a lot of money to be made and a lot of interest in the media to be found: Affective Computing. So, the challenge to the emotion scient-

ists is, and again apologies for oversimplifying, to leave the ivory tower and learn to convey in simple terms *what we actually know*. What engineers ask demands straightforward responses. How do emotions look from the point of view of an observer? What causes them? What functions do they have? We should think of this is an opportunity to re-focus our discussions. Maybe we can get clearer on what exactly we still need to know. Maybe being asked how to implement a concept is a chance to operationalize it more precisely. This is also a way to rekindle the scholarly fascination with emotions and make our work relevant in the real world. But there are of course additional risks when our theories are not just discussed in the abstract but put to work in automata.

Concerning facial expressions specifically, I think that we have at this point pretty clear empirical evidence that there is no one-to-one mapping between any specific emotional state and any specific display. Neither posed nor spontaneous expressions are clearly and uniquely distinguishable. A study might show that a particular cue is more often observable in condition A than in condition B, but this is *not* sufficient to make absolute statements about what faces express independently of the context.



The real world is fuzzy. We need to better understand this fuzziness, and artificial systems need to come to terms with that. This is a communication issue that requires consistency, precision, and the will to take "implementers" seriously. The alternative is that *we* are no longer taken seriously. A development team might say: "well, right, interesting stuff you are guys are arguing about…" – and they turn away and build a robot based on Ekman's *Science* paper from 1969. Why? Because it has the virtue of being simple, straightforward, and easy to implement mechanically.

The reality is that we have 50 more years of emotion science that shows just how complicated the encoding and decoding of nonverbal behavior actually is. We are starting to understand how dynamic interactions shape discourse and emotional communication. Much of this complexity CAN be implemented in artificial systems, but we must take the challenge of translating it in terms that an engineer can understand and benefit from very seriously. Our science will get better for it. And once more, it will be the fascination with faces and facial expressions that will have provided a major push to emotion science at large. And that makes me smile.

THE GREAT EXPRESSIONS DEBATE

In this issue of *Emotion Researcher*, three major research programs engage in a fascinating debate the nature and function of facial expressions. The first phase of the exchange is constituted by three manifesto pieces by Dacher Keltner and Daniel Cordaro (Basic Emotion Theory), Alan Fridlund (Behavioral Ecology View) and Jim Russell (Psychological Constructionism). We then move on to the debate itself, which covers many of the most contentious topics in expression research. This exchange will be republished by a major academic press in slightly edited form, so the authors retain the copyright of their articles.

Dacher Keltner, Department of Psychology, University of Berkeley and Daniel Cordaro, Department of Psychology, Yale University

Understanding Multimodal Emotional Expressions: Recent Advances in Basic Emotion Theory

---

Alan Fridlund, Department of Psychological and Brain Sciences, UC Santa Barbara

The Behavioral Ecology View of Facial Displays, 25 Years Later

---

Jim Russell, Department of Psychology, Boston College

Moving on from the Basic Emotion Theory of Facial Expressions

---

The Great Expressions Debate: Keltner and Cordaro vs. Fridlund vs. Russell

Understanding Multimodal Emotional Expressions: Recent Advances in Basic Emotion Theory

Dacher Keltner, Department of Psychology, University of California Berkeley & Daniel T. Cordaro, Department of Psychology, Yale University

 The current version benefitted from the editorial efforts of Andrea Scarantino. An expanded version will appear in a volume published by Oxford University Press.

Introduction

August 2015 – Basic Emotion Theory has proven to be a highly fruitful yet controversial set of ideas in the science of emotion, generating vigorous debate over the past 30 years (Barrett, Lindquist, & Gendron, 2007; Ekman, 1992; Ortony & Turner, 1990; Russell, 1994). At its core, Basic Emotion Theory consists of specific theses concerning (1) what the emotions are – in general terms, they are brief, unbidden, pancultural functional states that enable humans to efficiently respond to evolutionarily significant problems – and (2) how scientific research is to differentiate distinct emotions from one another – in expression, peripheral physiology, appraisal, and neural process (Ekman, 1992; Ekman & Cordaro, 2011; Ekman & Davidson, 1994).

Here, we focus on an especially contentious sub-domain of Basic Emotion Theory, namely its specific claims regarding emotional expression. Within this tradition, it is more specifically assumed that expressions of emotion: 1) are brief, coherent patterns of facial behavior that covary with distinct experiences; 2) signal the current emotional state, intentions, and assessment of the eliciting situation of the individual; 3) manifest some degree of cross-cultural universality in both production and recognition; 4) find evolutionary precursors in the signaling behaviors of other mammals in contexts similar to the social contexts humans encounter (e.g., when signaling adversarial intentions); and 5) covary with emotion-related physiological responses (for summaries, see Ekman, 1994; Hess & Fischer, 2013; Keltner & Haidt, 2001; Keltner & Kring, 1998; Matsumoto et al., 2008).

Much of the original support for Basic Emotion Theory comes from the well-known studies of Ekman and Friesen in New Guinea (Ekman, Sorenson, & Friesen, 1969). Using still photographs of prototypical emotional facial expressions, Ekman and Friesen were able to document universality in the production and recognition of a limited set of "basic" emotions, including anger, fear, happiness, sadness, disgust and surprise (for review, see Matsumoto et al., 2008). Subsequent critiques have raised questions about the degree of universality in the recognition of these emotional facial expressions (Russell, 1994), about what such expressions signal (Fridlund, 1991), about the response formats in the studies (Russell, 1994), and about the ecological validity of such exaggerated, prototypical expressions.

These productive debates have inspired a next wave of research on emotional expression, which advances Basic Emotion Theory in fundamental ways. In this essay we summarize – in broad strokes – what has been learned in the past 20 years of empirical study — and how the evidence yields a new set of propositions concerning the nature and universality of emotional expression within the framework of Basic Emotion Theory.

Emotional Expressions are Multi-modal, Dynamic Patterns of Behavior

Central to Basic Emotion Theory is the assumption that emotions enable the individual to respond adaptively to evolutionarily significant threats and opportunities in the environment – the cry of offspring, a threat from an adversary,

pursuing sexual opportunity in a social setting of rivals and potential mates (Ekman, 1992; Keltner & Haidt, 2001). Emotions enable such responses primarily through shifts in peripheral physiology (Levenson, Ekman & Friesen, 1990), patterns of cognition (Oveis, Horberg, & Keltner, 2010), movements of the body (e.g. the proverbial fight or fligh response), and expressive behavior that coordinates social interactions through the information it conveys and respon ses it evokes in others (e.g., Keltner & Kring, 1998; van Kleef, 2009).

Within this framework, emotions are fundamentally about action (Frijda, 1986). Emotions enable people to react to significant stimuli in the environment (or within themselves), in complex patterns of behavior involving multiple modalities – facial muscle movement, vocal cues, bodily movements, gesture, posture, and so on. For example, studies capturing experiences of sympathy find that this brief state involves bodily movements forward, soothing tactile behavior, oblique eyebrows, a fixed pattern of gaze, vocalizations, and skin-to-skin contact when sympathy leads to embrace (Goetz, Keltner, & Simon-Thomas, 2010).

Early studies of emotional expression, and the controversies they engendered, largely focused on the meaning of static portrayals of prototypical configurations of facial muscles of anger, disgust, fear, sadness, surprise, and happiness (Ekman, 1994; Russell, 1994). In the last 20 years, the scientific study of facial expressions has moved significantly beyond static portrayals of six emotions, revealing that emotional expressions are multimodal, dynamic patterns of behavior, involving facial action, vocalization, bodily movement, gaze, gesture, head movements, touch, autonomic response, and even scent (Keltner et al., in press).

Notably, the notion that emotional expressions are *multimodal patterns of behavior* is evident in Charles Darwin's own rich descriptions of the expressions of over 40 emotional states (Keltner, 2009), a portion of which we summarize in Table 1 (with focus on positive emotions).

Emotion	Description
Astonishment	eyes open, mouth open, eyebrows raised, hands placed over mouth
Contemplation	frown, wrinkle skin under lower eyelids, eyes divergent, head droops, hands to forehead, mouth, or chin, thumb/index finger to lip
Determination	firmly closed mouth, arms folded across breast, shoulders raised
Devotion	face upwards, eyelids upturned, fainting, pupils upwards and inwards, humbling kneeling posture, hands upturned
Happiness	eyes sparkle, skin under eyes wrinkled, mouth drawn back at corners
High spirits, Cheerfulness	smile, body erect, head upright, eyes open, eye brows raised, eyelids raised, nostrils raised, eating gestures (rubbing belly), air suck, lip smacks
Joy	muscle tremble, purposeless movements, laughter, clapping hands, jumping, dancing about, stamping, chuckle/giggle, smile, muscle around eyes contracted, upper lip raised.
Laughter	tears, deep inspiration, contraction of chest, shaking of body, head nods to and fro, lower jaw quivers up/down, lip corners drawn backwards, head thrown backward, shakes, head face red, muscle around eyes contracted, lip press/bite.
Love	beaming eyes, smiling cheeks (when seeing old friend), touch, gentle smile, protruding lips (in chimps), kissing, nose rubs.
Maternal love	touch, gentle smile, tender eyes
Pride	head, body erect, look down on others
Tender (sympathy)	tears

Table 1: Darwin's descriptions of the expressive behavior of positive emotions

We notice here that Darwin did not focus on what Ekman (1992) once called *momentary* facial expressions, the sorts

of expressions that can be captured with a snapshot, but rather on *extended* and *multimodal* dynamic patterns of behavior, in which the signal consists of a sequence of facial and non-facial actions that only collectively and over time convey the relevant message.

Focusing on more modalities than facial expression alone has enabled the discovery of new emotional expressions. For example, gaze patterns and head movements covary with the experience and signaling of embarrassment (Keltner, 1995), pride (Tracy & Robins, 2004), and awe (Campos et al., 2013), as we detail below. Thinking of emotional expressions as dynamic multimodal patterns of behavior also points to intriguing new questions (e.g., Aviezer, Trope, & Todorov, 2012).

What is the relative contribution of different modalities to the perception and signal value of emotional expressions (e.g., Flack, 2006; Scherer & Ellgring, 2007)? Why is it that certain emotions are more reliably signaled in multiple modalities, whereas other emotions are only recognized in one modality? For example, sympathy is reliably signaled in touch and the voice, but less so, in the face (Goetz et al., 2010). It is nearly impossible to communicate embarrassment through touch, but it is reliably communicated in patterns of gaze, head, and facial behavior.

There are More Emotional Expressions than the "Basic" Six

Critical to Basic Emotions Theory is the question of which emotions have distinctive signals. Evidence germane to this question informs taxonomies of emotion (e.g., Keltner & Lerner, 2010) and the search for emotion-specific responses in other systems, such as neuroendocrine or autonomic response systems (see below).

Past studies focused on figuring out momentary expressions captured by still photographs. As a result, only the "basic six" emotions – anger, disgust, fear, sadness, surprise, and happiness – emerged as having clear distinctive signals. But if emotional expressions are, as we claim and as suggested by Darwin, multimodal and dynamic, many more emotions may have distinctive signals, which could consist of facial changes over time in combination with other changes (e.g. vocal changes).

In recent years, dozens of studies have sought to differentiate the expressions of emotions other than the "basic" six, expanding the focus to modalities such as touch, voice, and artistic portrayal. In *emotion recognition* paradigms, participants attempted to choose the right label to designate an emotion-related facial expression, vocalization, or piece o music. In *emotion production* studies, participants attempted to communicate emotions to a naïve observer, who was tasked with guessing the emotion expressed. In *emotion encoding* studies, behavioral analyses ascertained whether the experience of an emotion was expressed in different behaviors than closely related states.

In Table 2, we summarize this new literature, indicating whether studies reveal that the facial, vocal, tactile, and music-related expressions of the emotion can be differentiated from expressions of other emotions. In the respective columns, "yes" indicates that the evidence suggests that the emotion is communicated in a modality at above chance levels; "no" indicates that the emotion cannot be reliably communicated in the modality. These data make the case for distinct expression of 24 emotional states when different modalities are considered, although we note that few if any studies have looked at multimodal expressions of emotion.

Emotion	Facial action	Voice	Touch	Music
Amused	yes[a,b,d,i]	yes[y,z,bb]	n/a	n/a
Anger	yes[d,w,x]	yes[y,aa,bb]	yes[dd,ee]	yes[ff]
Awe	yes[a,c,d]	yes[y]	no	n/a
Boredom	yes[n]	yes[aa]	n/a	n/a
Confused	yes[n,u]	n/a	n/a	n/a
Contempt	yes[v,w]	yes[y,aa]	n/a	n/a
Content	yes[d]	yes[z]	n/a	n/a
Coy	yes[e,f,g]	n/a	n/a	n/a
Desire	yes[h,i]	no[y]	n/a	n/a
Disgust	yes[d,w,x]	yes[y,aa,bb]	yes[dd,ee]	n/a
Embarrassed	yes[d,i,j,k,l]	yes[y]	no[ee]	n/a
Fear	yes[d,w,x]	yes[y,aa,bb]	yes[dd,ee]	yes[ff]
Gratitude	n/a	no[y]	yes[dd,ee]	n/a
Happiness	yes[i,w,x]	yes[aa]	yes[dd]	yes[ff]
Interested	yes[i,m,n]	yes[y]	n/a	n/a
Love	yes[d,i]	no[y]	yes[dd,ee]	yes[ff]
Pain	yes[o,p,q,r]	yes[cc]	n/a	n/a
Pride	yes[a,i]	no[y]	no[ee]	n/a
Relief	n/a	yes[y,z,aa,bb]	n/a	n/a
Sadness	yes[d,w,x]	yes[y,bb]	yes[dd,ee]	yes[ff]
Shame	yes[d,i,t]	no[y]	n/a	n/a
Surprise	yes[w,x]	yes[y,bb,ee]	no[ee]	n/a
Sympathy	yes[i]	yes[y]	yes[dd,ee]	n/a
Triumph	n/a	yes[y]	n/a	n/a

[a]Shiota, Campos, & Keltner (2003). [b]Keltner & Bonanno (1997). [c]Shiota, Keltner, Mossman (2007). [d]Hejmadi, Davidson, & Rozin (2000). [e]Reddy (2000). [f]Reddy (2005). [g]Bretherton & Ainsworth (1974). [h]Gonzaga et al. (2006). [i]Keltner & Shiota (2003). [j]Keltner & Buswell (1997). [k]Keltner (1996). [l]Ekman & Rosenberg (1997). [m]Silvia (2008). [n]Reeve (1993). [o]Prkachin (1992). [p]Williams (2002). [q]Grunau & Craig (1987). [r]Botvinick, et al. (2005). [s]Tracy & Robins (2004). [t]Tracy & Matsumoto (2008). [u]Rozin & Cohen (2003). [v]Ekman & Friesen (1986). [w]Ekman (1992). [x]Levenson, Ekman, & Friesen (1990). [y]Simon-Thomas, et al. (2009). [z]Sauter & Scott (2007). [aa]Schroder (2003). [bb]Sauter, Eisner, Ekman, & Scott (2010). [cc]Dubois et al. (2008). [dd]Hertenstein et al. (2009). [ee]Hertenstein et al. (2006). [ff]Juslin & Laukka (2003). [gg]Hejmadi, Davidson, & Rozin (2000). [hh]Piff, et al., (2012)

Table 2: Evidence related to the expression of emotion in different modalities

This new literature reveals that there are more emotions than the “Basic Six” and that emotions can be expressed in non-facial modalities. These discoveries speak to the promise of a multimodal approach to emotional expression anticipated in Table 1. Several critical questions await attention. Most notably, few if any production studies have examined how the different modalities of expression – face, voice, touch, body and gaze activity – covary during emotional expressions. Few if any emotion recognition studies have addressed whether multimodal expressions are more reliably recognized than single modality expressions, for example in the face or voice – largely the focus of research to the present date.

Patterns of Emotional Expression Vary Within Emotion and Across Individuals and Cultures

Within traditional Basic Emotion Theory, the focus has been on prototypical facial expressions, namely facial expressions that are "best examples" of the expressions associated with an emotion (Ekman, 1992). This has been a prerequisite of the still photograph method, so profoundly influential in the field, which demanded focusing on behaviors that characterize paradigmatic cases of the emotion and can be captured with a snapshot (e.g., the tightened lips during prototypical episodes of anger).

As critics have pointed out, this focus has led to a neglect of less prototypical expressions of emotions, namely other behaviors that vary more in whether or not they occur during an emotional experience (e.g. the face touch during embarrassment). These latter behaviors are more likely to vary across context, individuals, or cultures. Once we expand the focus from prototypical momentary expressions to *all* extended expressions of any given emotion, it becomes clear that there is no one-to-one correspondence between a specific set of facial muscle actions or vocal cues and any and every experience of an emotion; instead, this approach suggests probabilistic associations between the multimodal behaviors and the occurrence of the emotion.

One clear implication is that there will be significant variation within a category of emotion (e.g., embarrassment, awe) in the patterns of behavior that covary with the occurrence of the emotion, most typically ascertained with self-report measures. For example, in an early study of the expressive behavior of embarrassment, it was found that different patterns of behavior arose during the experience of embarrassment (Keltner, 1995; for similar evidence concerning pride, see Tracy & Robins, 2004). Most displays of embarrassment involved gaze down, head movements down, and awkward smiles, but some involved face touching, some involved shoulder shrugs, and some involved pained, self-conscious vocalizations.

Additionally, the more expressions of embarrassment include the full complement of prototypical features – the gaze down, head movement down, awkward smile, face touch–, the more naïve observers reliably recognize the emotion in the display. Studies of emotion-related tactile contact similarly find variation in the patterns of tactile behavior (location, pressure, configuration of hand) within the expression of one emotion, such as gratitude or sympathy (Hertenstein et al., 2006).

In moving away from the assumption that there is necessarily a one-to-one correspondence between emotional experience and specific expressive behaviors, empirical research can capture different sources of emotion-related variation in expressive behavior. A first is to study subtypes of an emotion, which vary according to specific appraisal themes. Emotion concepts such as "embarrassment" or "awe" or "anger" actually refer to a variety of states within that emotion family (for example, people experience awe that varies in the sense of beauty, fear, supernatural causation; Keltner & Haidt, 2003). The challenge for future research will be to map specific variations of an emotional state – such as awe involving threat versus no threat – to specific elements of the pattern of expressive behavior.

A second source of variation consists of cultural differences in the multimodal expression of emotions. As an illustration, in one recent study participants in five different cultures – China, India, Japan, Korea, and the USA – heard twenty-two emotion-specific situations in their native language and were asked to express the emotion in whatever fashion they desired, which could include facial, vocal, or bodily expressions (Cordaro, 2013). The only instruction was that the expressions were to be nonverbal. Over 5500 facial expressions, bodily movements, gaze movements, hand gestures, and patterns of breathing were coded using an expanded Facial Action Coding System (Ekman & Friesen, 1978), and a large subset of these was analyzed for patterns across and within cultures.

For all emotions studied, certain collections of expressive behaviors were frequently observed across all five cultural groups, which were deemed *International Core Sequences* – the prototypical elements of the multimodal hyperspace of variation in emotional expression. Across cultures the expression of awe, for example, tended to involve the widening of the eyes and a smile as well as a head movement up. Across cultures, head nods expressed interest. Confusion was generally expressed with behaviors including furrowed brows, narrowed eyes, and a head tilt. At the same time, there were certain patterns of behavior that were observed within, but not between, cultures, and these were de-

emed *Culturally Varying Sequences.* These patterns of expressive behavior were unique to the culture, and have been called “emotion accents” in other studies (Elfenbein, 2013). We propose that these cultural accents are shaped by display rules that predicate the amplification or masking of emotional displays according to the value attached to the specific emotion.

Search for Neurophysiological Correlates of Emotional Expression

Within Basic Emotions Theory, it is assumed that emotions involve emotion-specific physiology, which enable specific behaviors in response to eliciting stimuli – flight, skin-to-skin contact, the widening of the eyes to take in more information, clasping and striking. On this view, expressive behaviors are elements of more complex, emotion-specific patterns of action, useful in our evolutionary past (e.g., Darwin, 1872; Shariff & Tracy, 2011). This analysis suggests that patterns of expression should covary with activation in different neurophysiological systems that are conserved across mammals. Early studies of emotion-specific physiology focused on a limited set of emotions and select measures of peripheral physiology – heart rate, skin conductance, temperature of the skin (Levenson, Ekman & Friesen, 1990).

New discoveries of multimodal patterns of expression of a far wider array of emotions than the basic six have enabled new areas on inquiry in the search for emotion-specific physiology. For example, brief nonverbal displays of love (Duchenne smile, head tilt, open handed gestures) correlate with oxytocin release, whereas cues of sexual desire (lip licks, lip puckers) do not (Gonzaga et al., 2006), a finding that is in keeping with functional analyses of oxytocin as a motivator of commitment and the provision of care in mammalian species (Keltner et al., 2014).

Sympathy-related oblique eyebrow movements relate to increased activation in the vagus nerve, a branch of the parasympathetic autonomic nervous system that supports care-giving in mammals (Eisenberg et al., 1989; Stellar, Cohen, Oveis, & Keltner, 2015). Again, this is in keeping with functional analyses of sympathy as a caregiving emotion. Still other studies have documented that dominance-related postural expansion associated with pride elevates levels of testosterone, a hormone thought to be involved in the signaling of elevated status (Carney, Cuddy, & Yap, 2010).

In Table 3 we summarize these findings. For example, the cytokine system is part of an inflammation response and is associated with submissive responses on nonhuman species, and shame in humans (Dickerson & Kemeny, 2004), and we would suggest, shame-related displays. Recent self-report studies find unique associations between cold shivers and fear and disgust, and goosebumps (piloerection) and awe (Campos et al., 2013; Maruskin et al., 2012). By integrating studies of multimodal expressions for a variety of emotions other than the basic six with advances in neurophysiology, new insights are gained into emotion-specific physiology. Critical questions await empirical attention. Most notably, it will important to examine the temporal sequences in which experience, expression, and emotion-specific physiology unfold, and the degree of coherence between these systems.

Emotion	Neurophysiological Response
Awe	Piloerection
Embarrassment	Blush Response
Love	Oxytocin Release
Pride	Testosterone Release
Shame	Cytokine Release
Sympathy	Vagus Nerve Elevation

Table 3: Associations between Emotional Expression and Neurophysiological Response

Mammalian Precursors to Human Emotional Expression

Critical to Basic Emotions Theory is the notion that human emotional expression arose during the process of mammalian evolution, and by implication, that there should be compelling homologies between human and non-human display behavior. Careful cross-species comparisons between human and nonhuman expressive behavior have revealed functional origins of laughter, smiling, embarrassment, affiliative cues involved in love, sexual signaling, threat displays, and dominance (for review see Keltner et al., in press). Careful analyses of nonhuman vocal display find distinct displays for sex, food, affiliation, care-giving, and threat (Snowdon, 2003).

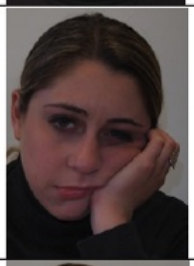
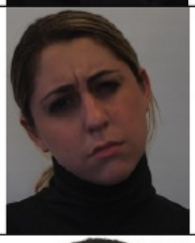
These cross-species comparisons are critical to functional claims so central to Basic Emotions Theory: that emotional expressions serve specific functions within social contexts common to many mammals – for example, that human embarrassment resembles the behaviors of other species' appeasement displays, and triggers similar patterns of conflict de-escalating reconciliation (Keltner & Buswell, 1997). This search for mammalian precursors, an enduring theme in Basic Emotions Theory, points to a means to understand the deeper origins of human emotion, providing suggestive evidence of what patterns of mammalian social behavior gave rise to human emotional expression.

For example, it is interesting to speculate how human expressions of gratitude involved in touch (Hertenstein et al., 2006) trace back to the grooming exchanges and food sharing in primates that support reciprocal sharing and cooperation (de Waal, 1996). It is provocative but speculative to consider how the contexts in which nonhuman piloerection occur might inform the understanding of the evolution of awe. How do rodent displays of shuddering and shivering give rise to our own shudders of social disgust? Looking to nonhuman species is a critical means by which Basic Emotions Theory reveals the origins of different emotions.

Gradients of Recognition in Universal Recognition of Emotional Expression

Emotion recognition studies have sought to ascertain the extent to which emotional expressions – facial expressions and vocalizations in particular – are recognized in different cultures (Gendron et al., 2014; Haidt & Keltner, 1999; Sauter et al., 2014). Subsequent critiques of this literature have brought into focus the limitations of forced choice paradigms, the need to study more ecologically valid displays, and the continuing need to study cultures who have not been influenced by media portrayals of emotional expression (Gendron et al., 2014; Haidt & Keltner, 1999; Russell, 1994; Sauter et al., 2014).

Yet another advance in this area of research is the notion that emotions vary in the degree to which they can be reliably signaled, in the sense that there are gradients of recognition (Haidt & Keltner, 1999; Russell, 1994). As one illustration, in a recent study, Cordaro (2013), guided by the emotion expression taxonomy represented in Table 1, produced static photos of 18 emotions expressed in the face and body, and presented these photos to naïve observers in 10 cultures: China, Japan, Korea, New Zealand, Germany, Poland, Pakistan, India, Turkey, and the United States. Those participants were required to choose the best label, from four emotion labels of the same valence as well as "none of the above," that matched the expression in the photo. The photos are portrayed in Table 4, and the data from this study, summed across cultures, are presented in Figure 1.

Emotion	Example photo	Action units	Physical description
Amusement		6+7+12+25+26+53	Head back, Duchenne smile, lips separated, jaw dropped
Anger		4+5+17+23+24	Brows furrowed, eyes wide, lips tightened and pressed together
Boredom		43+55	Eyelids drooping, head tilted, (not scored with FACS: slouched posture, head resting on hand)
Confusion		4+7+56	Brows furrowed, eyelids narrowed, head tilted
Contentment		12+43	Smile, eyelids drooping
Coyness		6+7+12+25+26+52+54+61	Duchenne smile, lips separated, head turned and down, eyes turned opposite to head turn
Desire		19+25+26+43	Tongue show, lips parted, jaw dropped, eyelids drooping

Disgust		7+9+19+25+26	Eyes narrowed, nose wrinkled, lips parted, jaw dropped, tongue show
Embarrassment		7+12+15+52+54+64	Eyelids narrowed, controlled smile, head turned and down, (not scored with FACS: hand touches face)
Fear		1+2+4+5+7+20+25	Eyebrows raised and pulled together, upper eyelid raised, lower eyelid tense, lips parted and stretched
Happiness		6+7+12+25+26	Duchenne display
Interest		1+2+12	Eyebrows raised, slight smile
Pain		4+6+7+9+17+18+23 +24	Eyes tightly closed, nose wrinkled, brows furrowed, lips tight, pressed together, and slightly puckered
Pride		53+64	Head up, eyes down

Sadness		1+4+6+15+17	Brows knitted, eyes slightly tightened, lip corners depressed, lower lip raised
Shame		54+64	Head down, eyes down
Surprise		1+2+5+25+26	Eyebrows raised, upper eyelid raised, lips parted, jaw dropped
Sympathy		1+17+24+57	Inner eyebrow raised, lower lip raised, lips pressed together, head slightly forward

Table 4: Facial expression examples, FACS action units, and physical descriptions for each expression

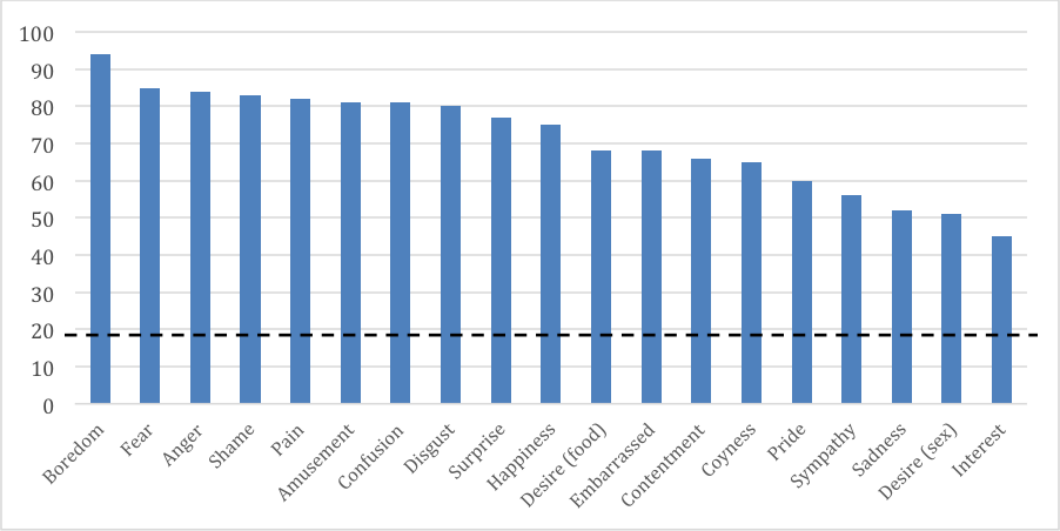


Figure 1: Recognition rates in identifying 19 emotional expressions in the face and body across ten cultures. Dashed lines indicate chance levels of guessing (20%)

The dashed lines represent levels of recognition that would be observed by chance guessing alone, which would be 20% given that participants chose one label from five options in each judgment. What one can see in Figure 1 is clear evidence that when static photos capture head movements, gaze activity, and face touching, many more emotions than the basic six can be recognized, even in static photos, as we have been arguing.

These data also illustrate something systematically observed in nearly every recognition study: some emotions are more easily recognized than others (e.g. boredom is more easily recognized than interest). Framing the debate about the recognition of emotion across cultures in either/or terms does not represent what the evidence more typically reveals, that there are gradients of recognition, with some emotions more reliably recognized than others.

Toward the Future Empirical Study of Emotional Expression

The study of emotional expression has changed dramatically in the past 20 years. The field is now investigating a much wider array of emotions and how they are expressed in dynamic, multimodal patterns of behavior. Significant advances have been made in understanding the neurophysiological correlates of these patterns of behavior, and their homologues in other mammals.

We end with several critical questions. First, it is striking how few emotion encoding studies there are wherein researchers study how expressive behavior correlates with emotional experience; instead, almost all studies we have considered have been emotion recognition studies, as illustrated above, or emotion production studies wherein participants are given an emotion concept ("disgust") and asked to express in nonverbally.

Similarly, few studies have examined how well multimodal expressions of emotion can be recognized, and are universal across cultures. These are critical lacunae in the field. The debates concerning the universality of emotion have been more focused upon similarities and differences in the recognition of facial expressions of the basic six emotions, and vocalizations of a broader array of emotions (Haidt & Keltner, 1999). Almost exclusively, studies of universality have used single modalities: static photos of facial expressions (e.g., Matsumoto et al., 2008) or brief vocal bursts or epochs of emotional prosody (Juslin & Laukka, 2003) or videos of emotional tactile contact (Hertenstein et al., 2006).

Across these kinds of studies emotion recognition across cultures tends to hover between 55 and 70%, where chance guessing would yield accuracy levels between 12.5% and 25% percent, depending on estimates of chance. We believe accuracy levels may typically be higher once multimodal expressions, which are much closer to the natural expressions we should ultimately be focusing on, are presented rather than unimodal expressions.

Finally, it will be important to move beyond emotion matching paradigms, where single emotion words are matched to stimuli, and to move to free response studies that investigate the communicative dimensions of multimodal emotional expressions. The problem with forced choice studies is not only that they inflate consensus (Russell, 1994), but also that they wrongly suggest that what matters from a communicative point of view is only which discrete emotion the subject is experiencing. But it is clear that emotional expressions can signal multiple things besides interior experiences ("I feel grateful"): they can signal intentions ("I would like to kiss you"), relations with the perceiver ("you are more powerful than me"), assessments of the eliciting situation ("the actions of that officer are unjust"), and trait-like tendencies ("I am hostile").

We suggest that specific expressive modalities may communicate different kinds of information. For example, body movement – expanding versus concave chest – differentiates the displays of pride and shame and would seem to relate to the relational dimension of dominance and submissiveness. Eye contact versus gaze aversion may instead signal behavioral intentions, namely social approach versus withdrawal. Understanding the role of each expressive modality in the communication of distinct types of information will be crucial for understanding how emotions evolved.

Finally, debates over the universality of emotional expressions have too often been carried out in dichotomous terms, with the two sides debating whether expressions are universal. New developments in the study of emotional expression suggest that it is time to move away from such Manichean formulations. The extent to which a certain pattern of expressive behavior is universally produced and recognized in radically different cultures will vary according to the emotion (e.g. anger may be more recognizable than sadness), its modality of expression (e.g. relief may be recognizable in the voice but not in the face), its subtype (e.g. awe about beauty may be more recognizable than awe about supernatural causation) and the culture in which it is presented (e.g. Japanese facial expressions may be better recognized by Japanese people).

We hope that the new perspective we have offered here concerning dynamic, multimodal expressions, grounded in Basic Emotions Theory, sets the stage for studies seeking answers to these and other questions.

References

Aviezer, H., Trope, Y., & Todorov, A. (2012). Body cues, not facial expressions, discriminate between intense positive and negative emotions. *Science*, *338*(6111), 1225-1229.

Barrett, L. F., Lindquist, K. A., & Gendron, M. (2007). Language as context for the perception of emotion. *Trends in Cognitive Sciences*, *11*(8), 327-332.

Botvinick, M., Jha, A. P., Bylsma, L. M., Fabian, S. A., Solomon, P. E., & Prkachin, K. M. (2005). Viewing facial expressions of pain engages cortical areas involved in the direct experience of pain. *Neuroimage*, *25*(1), 312-319.

Bretherton, I., & Ainsworth, M. D. S. (1974) Responses of one-year-olds to a stranger in a strange situation. In M. Lewis & L. A. Rosenblum (Eds.) *The origin of fear*. (pp. 131-164). New York: Wiley.

Campos, B., Shiota, M., Keltner, D., Gonzaga, G., & Goetz, J. (2013). What is shared, what is different? Core relational themes and expressive displays of eight positive emotions. *Cognition & Emotion, 27,*37-52.

Carney, D. R., Cuddy, A. J., & Yap, A. J. (2010). Power posing brief nonverbal displays affect neuroendocrine levels and risk tolerance. *Psychological Science*, *21*(10), 1363-1368.

Cordaro, D. T. (2013). Universals and cultural variations in expression in five cultures. Unpublished Doctoral Dissertation, University of California, Berkeley.

Darwin, C. (1872/1998). *The expression of the emotions in man and animals* (3rd ed.). New York: Oxford University Press.

De Waal, F. B. (1996). *Good natured* (No. 87). Cambridge: Harvard University Press.

Dickerson, S. S., & Kemeny, M. E. (2004). Acute stressors and cortisol responses: A theoretical integration and synthesis of laboratory research. *Psychological Bulletin*, *130*(3), 355.

Dubois, A., Bringuier, S., Capdevilla, X., & Pry, R. (2008). Vocal and verbal expression of postoperative pain in preschoolers. *Pain Management Nursing*,*9*(4), 160-165.

Eisenberg, N., Fabes, R. A., Miller, P. A., Fultz, J., Shell, R., Mathy, R. M., & Reno, R. R. (1989). Relation of sympathy and personal distress to prosocial behavior: A multimethod study. *Journal of Personality and Social Psychology*, *57*(1), 55.

Ekman, P. E., & Davidson, R. J. (1994). *The nature of emotion: Fundamental questions*. Oxford University Press.

Ekman, P., & Rosenberg, E. L. (Eds.). (1997). *What the face reveals: Basic and applied studies of spontaneous expression using the Facial Action Coding System (FACS)*. New York: Oxford University Press.

Ekman, P., & Friesen, W. V. (1986). A new pan-cultural facial expression of emotion. *Motivation and Emotion*, *10*(2), 159-168.

Ekman, P., & Friesen, W. V. (1978). *Facial Action Coding System: Investigatoris Guide*. Consulting Psychologists Press.

Ekman, P. (1992). All Emotions Are Basic. In Ekman & Davidson (Eds.), *The Nature of Emotion* (pp. 15-19). New York Oxford University Press.

Ekman, P., & Cordaro, D. (2011). What is meant by calling emotions basic. *Emotion Review*, *3*(4), 364-370.

Ekman, P., Sorenson, E.R., & Friesen, W.V. (1969). Pan-cultural elements in the Facial Display of Emotions. *Science*, 164, 86-88.

Elfenbein, H. A. (2013). Nonverbal dialects and accents in facial expressions of emotion. *Emotion Review*, *5*(1), 90-96.

Flack, W. (2006). Peripheral feedback effects of facial expressions, bodily postures, and vocal expressions on emotional feelings. *Cognition & Emotion*, *20*(2), 177-195.

Fridlund, A. J. (1991). Evolution and facial action in reflex, social motive, and paralanguage. *Biological Psychology*, *32*(1), 3-100.

Frijda, N. H. (1986). *The Emotions*. New York: Cambridge University Press.

Gendron, M., Roberson, D., van der Vyver, J. M., & Barrett, L. F. (2014). Cultural relativity in perceiving emotion from vocalizations. *Psychological Science*, *25*(4), 911-920.

Goetz, J. L., Keltner, D. & Simon-Thomas, E. (2010). Compassion: An evolutionary analysis and empirical review. *Psychological Bulletin*, *136*(3), 351-374.

Gonzaga, G. C., Turner, R. A., Keltner, D., Campos, B., & Altemus, M. (2006). Romantic love and sexual desire in close relationships. *Emotion*, *6*(2), 163.

Grunau, R. V., & Craig, K. D. (1987). Pain expression in neonates: facial action and cry. *Pain*, *28*(3), 395-410.

Haidt, J., & Keltner, D. (1999). Culture and facial expression: Open-ended methods find more faces and a gradient of recognition. *Cognition & Emotion*, *13*, 225-266.

Hejmadi, A., Davidson, R. J., & Rozin, P. (2000). Exploring Hindu Indian emotion expressions: Evidence for accurate recognition by Americans and Indians. *Psychological Science*, *11*(3), 183-187.

Hertenstein, M. J., Holmes, R., McCullough, M., & Keltner, D. (2009). The communication of emotion via touch. *Emotion*, *9*(4), 566.

Hertenstein, M. J., Keltner, D., App, B., Bulleit, B. A., & Jaskolka, A. R. (2006). Touch

communicates distinct emotions. *Emotion*, *6*(3), 528.

Hess, U., & Fischer, A. (2013). Emotional mimicry as social regulation. *Personality and Social Psychology Review*, 17(2), 142–157.

Juslin, P. N., & Laukka, P. (2003). Communication of emotions in vocal expression and music performance: Different channels, same code?. *Psychological Bulletin*, *129*(5), 770.

Keltner, D., & Haidt, J. (2003). Approaching awe, a moral, spiritual, and aesthetic emotion. *Cognition & Emotion*, *17*(2), 297-314.

Keltner, D. & Kring, A.M. (1998). Emotion, social function, and psychopathology. *Review of General Psychology*, *2*(3), 320-342.

Keltner, D. (2009). Born to be good: The science of a meaningful life. New York: WW Norton & Company.

Keltner, D. (1995). Signs of appeasement: Evidence for the distinct displays of embarrassment, amusement, and shame. *Journal of Personality and Social Psychology*, *68*(3), 441-454.

Keltner, D. & Lerner, J. (2010). Emotion. In Fiske, Giblert and Lindzey (Eds.), *Handbook of Social Psychology*, Volume 1 (pp. 317-342). New Jersey: John Wiley & Sons, Inc.

Keltner, D., & Shiota, M. N. (2003). New displays and new emotions: A commentary on Rozin and Cohen (2003).

Keltner, D., & Bonanno, G. A. (1997). A study of laughter and dissociation: Distinct correlates of laughter and smiling during bereavement. *Journal of Personality and Social Psychology*, *73*(4), 687.

Keltner, D. (1996). Evidence for the distinctness of embarrassment, shame, and guilt: A study of recalled antecedents and facial expressions of emotion. *Cognition & Emotion*, *10*(2), 155-172.

Keltner, D., & Buswell, B. N. (1997). Embarrassment: Its distinct form and appeasement functions. *Psychological Bulletin*, *122*(3), 250.

Keltner, D., Tracy, J., Sauter, D., Cordaro, D., & McNeil, G. (in press). Emotional Expression. In L.F. Barrett (Ed.). *Handbook of Emotion*.

Keltner, D., & Haidt, J. A. (2001). Social functions of emotions. In Mayne & Bonanno, (Eds.), *Emotions: Current Issues and future directions*. New York, NY, US: Guilford Press.

Keltner, D., Kogan, A., Piff, P. K., & Saturn, S. R. (2014). The sociocultural appraisals, values, and emotions (SAVE) framework of prosociality: Core processes from gene to meme. *Annual review of psychology*, *65*, 425-460.

Levenson, R. W., Ekman, P., & Friesen, W. V. (1990). Voluntary facial action generates emotion-specific autonomic nervous system activity. *Psychophysiology*, *27*(4), 363-384.

Maruskin, L. A., Thrash, T. M., & Elliot, A. J. (2012). The chills as a psychological construct: Content universe, factor structure, affective composition, elicitors, trait antecedents, and consequences. *Journal of Personality and Social Psychology*, *103*(1), 135.

Matsumoto, D., et al. (2008). Facial expressions of emotion. In Lewis, Haviland-Jones & Barrett (Eds.), *Handbook of Emotions*, Third Edition (pp. 211-234). New York: The Guilford Press.

Ortony, A., & Turner, T. J. (1990). What's basic about basic emotions?. *Psychological Review*, *97*(3), 315.

Oveis, C., Horberg, E. J., & Keltner, D. (2010). Compassion, pride, and social intuitions of self-other similarity. *Journal of Personality and Social Psychology*,*98*(4), 618.

Piff, P. K., Purcell, A., Gruber, J., Hertenstein, M. J., & Keltner, D. (2012). Contact high: Mania proneness and positive perception of emotional touches. *Cognition & Emotion*, *26*(6), 1116-1123.

Prkachin, K. M. (1992). The consistency of facial expressions of pain: A comparison across modalities. *Pain*, *51*(3), 297-306.

Reddy, V. (2000). Coyness in early infancy. *Developmental Science*, *3*(2), 186-192.

Reddy, V. (2005). Feeling shy and showing-off: Self-conscious emotions must regulate self-awareness. *Emotional Development*, 183-204.

Reeve, J. (1993). The face of interest. *Motivation and Emotion*, 17(4), 353-375.

Rozin, P., & Cohen, A. B. (2003). High frequency of facial expressions corresponding to confusion, concentration, and worry in an analysis of naturally occurring facial expressions of Americans. *Emotion*, *3*(1), 68.

Russell, J. A. (1994). Is there universal recognition of emotion from facial expressions? A review of the cross-cultural

studies. *Psychological Bulletin*, *115*(1), 102-141.

Sauter, D. A., & Scott, S. K. (2007). More than one kind of happiness: Can we recognize vocal expressions of different positive states? *Motivation and Emotion, 31*(3), 192–199.

Sauter, D. A., Eisner, F., Ekman, P., & Scott, S. K. (2010). Cross-cultural recognition of basic emotions through non-verbal emotional vocalizations. *Proceedings of the National Academy of Sciences*, *107*(6), 2408-2412.

Sauter, D. A., Gangi, D., McDonald, N., & Messinger, D.S. (2014). Nonverbal expressions of positive emotions. In M.N. Shiota, M.M. Tugade, and L.D. Kirby (Eds.) *Handbook of Positive Emotion* (pp 179-200). New York: Guilford Press.

Scherer, K. R., & Ellgring, H. (2007). Multimodal expression of emotion: Affect programs or componential appraisal patterns?. *Emotion*, *7*(1), 158.

Schröder, M. (2003). Experimental study of affect bursts. *Speech Communication*, *40*(1), 99-116.

Shariff, A. F., & Tracy, J. L. (2011). What are emotion expressions for?. *Current Directions in Psychological Science*, *20*(6), 395-399.

Shiota, M. N., Campos, B., & Keltner, D. (2003). The faces of positive emotion: prototype displays of awe, amusement and pride. *Annals of the New York Academy of Sciences*, *1000*, 296.

Shiota, M. N., Keltner, D., & Mossman, A. (2007). The nature of awe: Elicitors, appraisals, and effects on self-concept. *Cognition & Emotion*, *21*(5), 944-963.

Silvia, P. J. (2008). Interest—The curious emotion. *Current Directions in Psychological Science*, *17*(1), 57-60.

Simon-Thomas, E. R., Keltner, D. J., Sauter, D., Sinicropi-Yao, L., & Abramson, A. (2009). The voice conveys specific emotions: Evidence from vocal burst displays. *Emotion*, *9*(6), 838.

Snowdon, C.T. (2003). Expression of Emotion in Nonhuman Animals. In Davidson, Scherer & Goldsmith (Eds.), *Handbook of Affective Sciences* (pp. 457-534). New York: Oxford University Press.

Stellar, J. E., Cohen, A., Oveis, C., & Keltner, D. (2015, January 26). Affective and Physiological Responses to the Suffering of Others: Compassion and Vagal Activity. *Journal of Personality and Social Psychology*. Advance online publication.

Tracy, J. L., & Robins, R. W. (2004). Show your pride evidence for a discrete emotion

expression. *Psychological Science*, *15*(3), 194-197.

Tracy, J.L. & Matsumoto, D. (2008). The spontaneous expression of pride and shame: Evidence for biologically innate nonverbal displays. *Proceedings of the National Academy of Sciences*, *105*(33), 11655-11660.

Van Kleef, G. A. (2009). How emotions regulate social life: The emotions as social information (EASI) model. *Current Directions in Psychological Science*, *18*, 184-188.

Williams, A. C. D. C. (2002). Facial expression of pain, empathy, evolution, and social learning. *Behavioral and Brain Sciences*, *25*(04), 475-480.

The Behavioral Ecology View of Facial Displays, 25 Years Later

Alan J. Fridlund, Department of Psychological and Brain Sciences, UC Santa Barbara

The current version benefitted from the editorial efforts of Andrea Scarantino. An expanded version will appear in a volume published by Oxford University Press.

August 2015 – I began as an adherent of the Basic Emotions Theory (BET) of facial expressions. In most formulations, BET held that emotions, understood as internal states or discrete affect categories, were associated with specific patterned movements termed "facial expressions of emotion." The foundation for BET was research in which members of diverse cultures matched a small number of photos of posed facial expressions to a similarly small number of emotion terms, suitably translated or mapped onto stories (Ekman, 1972; Ekman & Friesen, 1971; Ekman, Sorenson & Friesen, 1969; Izard, 1972).

These matching-to-sample studies, jointly with other evidence, were declared to mean that: (1) the emotions signified by the terms/stories were "biologically based," i.e., they were phylogenetic; (2) the emotional facial expressions matched to the emotion terms were uniform in their production and universal in their recognition; and (3) there was an automatic, causal link between the prototypical emotional faces and the respective internal emotional mechanisms (collectively, the "Facial Affect Program") that produced them. In BET, any deviation from the predicted correspondence between a triggered emotion and the emission of its counterpart facial expression was due to the intervention of cultural "display rules" governing social behavior (Ekman & Friesen, 1969). Such culturally dependent control was imperfect, however, and so a muted, throttled or distorted expression might "leak" traces of the suppressed, genuine emotion of the expressor onto the face.

At the start of my career, BET was the dominant framework for studying emotion and facial expression, and I had no reason to challenge it. I began by conducting electromyographic studies of the tiny facial movements people made during emotional imagery (Fridlund, Schwartz & Fowler, 1984), work begun by Paul Fair and Gary Schwartz (Schwartz, Fair et al., 1976). Gary invited me to his Yale lab to conduct my doctoral studies, and introduced me to Silvan Tomkins. Later he arranged for me to meet Carroll Izard and Paul Ekman, the two leading BET theorists at the time. I came to know both men well, and I may be the only person to have written papers with each (Ekman & Fridlund, 1987; Fridlund, Ekman, & Oster, 1988; Fridlund & Izard, 1983; Matsumoto, Ekman, & Fridlund, 1990). Over time, however, I developed unresolvable disagreements with them over the tenets of BET.

My skepticism about BET came from four growing realizations: (1) the cross-cultural findings could never have been helpful in apportioning roles to "biology" vs. "culture," because both diversity and uniformity can arise from natural selection (think finches); (2) claiming cross-cultural uniformity for certain iconic facial expressions after obtaining matches to emotion categories, *and* universality of those "basic emotions" based on the same matches, was circular and tautological; (3) on closer inspection, the matching between facial displays and emotion terms/stories began to appear inflated to me and other researchers, due to technical deficiencies in the experimental protocols; and, most important, (4) regarding the face as an automatic but suppressible readout of internal, "authentic" emotional states conflicted with modern views of animal communication. This last point was most critical in convincing me that BET was fatally flawed.

Darwin first attempted systematically to link animal signaling with our facial expressions, and BET theorists duly pay

homage to him, but misread him when they cite him to support their claim that our facial expressions evolved "to express emotion" (see Fridlund, 1992a). In promulgating evolution by natural selection, Darwin had first to dispose of a contending position: the Argument from Design, made by Charles Bell, William Paley and others, which held that creatures were well-suited to their niches because *God made them so*. Thus, in *On the Origin of Species*, Darwin could not repeat identical evidence of goodness-of-fit and then argue a different conclusion. Instead, he used evidence of *imperfect* design – vestigial structures such as webbed feet on land birds, phalanges in a seal's flipper, and the human appendix – as proof of common origins and to vitiate notions of perfect design *ex nihilo* (Browne, 1985; Darwin, 1859; Fridlund, 1992*a;* Gruber, 1974).

In *The Expression of the Emotions in Man and Animals*, Darwin extended his assault on the Design argument to Bell's view of facial expressions: "I want, anyhow, to upset Sir C. Bell's view … that certain muscles have been given to man solely that he may reveal to other men his feelings" (F. Darwin, 1887, Vol. 2, p. 78.). He proposed instead that, as with vestigial organs, most facial behaviors were likewise rudimentary *and* "of no service, often of much disservice," or "purposeless" (Darwin, 1872, pp. 67, 76). They were either remnants of reflexes that had been useful ("serviceable associated habits"), antithetical remnants arising from contrasting elicitors ("antithesis"), or overflows of excitation ("direct actions of the nervous system"). Any communicative value for facial expressions was incidental. Although Darwin's account neutered Bell's creationism, it left him unequipped to argue that facial expressions evolved *for* anything (Fridlund, 1992a).

While honoring Darwin, BET actually co-opted the 1950's mechanistic ethology of Lorenz and Tinbergen (Lorenz, 1967, 1970; Tinbergen, 1952, 1953). These early ethologists' tripwire fixed-action patterns became the "Facial Affect Program" of the neurocultural version of BET (even the "FAP" acronyms were identical; Fridlund, 1992b). Instead of red spots on beaks that released appeasement displays and food calls, prototypical emotional events triggered the release ("expression") of emotion that spilled out on our faces and reflected our "true feelings" except if modified by tradition ("display rules"), training, or treachery.

If BET was drawing upon the Lorenz-Tinbergen formulations, modern ethology was abandoning them, leaving BET gutted of its claim to Darwin's imprimatur and severing BET from any continuity with developing models of animal communication. Animal behaviorists began to note that most nonhuman signals didn't look fixed or cartooney, but flexible, social and contextual (Alcock, 1984; Hinde, 1985a, b; Smith, 1977). Such *behavioral ecologists* (cf., Davies, Krebs, & West, 2012; Maynard Smith, 1982) saw animal signaling not as vestigial reflexes, or readouts of internal state, but as adaptations that served the interests of signalers within their social environments. Signaler and recipient – even when predators and prey (e.g., "pursuit deterrence" signals; see Caro, 2005) – were reconceived as coevolved dyads in which displays indicated the likely behavior of issuers, with recipients using such behavior as cues to the issuers' next moves (Krebs & Davies, 1987; Krebs & Dawkins, 1984).

Although Darwin's vestigial reflexology in *Expression* was outdated, it seemed to me that modern behavioral ecology's view of expressive behavior as dynamic and contextual offered a way to resurrect Darwin's grander vision of continuity between human and nonhuman signaling. Thus, in the 1990's, I began writing position papers and conducting studies on what became the Behavioral Ecology View (BECV) of human facial behavior. In this account, human facial displays, like animal signals, serve the momentary "intent" of the displayer toward others in social interaction (Fridlund, 1990; 1991a, b; 1992a, b; 1994; 1996; 2002; 2006). ("Intent" here is adduced from people's interactional trajectory; it does not presuppose that people know, can articulate, and/or will disclose what they intend).

Indeed, many of the classic, iconic BET expressions can be recast in such intentional, functional terms. In suitable contexts, so-called "happy faces" solicit affiliation or play, whereas "sad faces" recruit succor, "anger faces" threaten or deter, "fear faces" predict submission or withdrawal, "disgust faces" indicate rejection or intent to spew, and so on (see Table 1 below).

Basic Emotions Theory [Facial "Expressions of Emotion"]	Behavioral Ecology View [Partial Sample of Context-Dependent Functions]
"Felt" (happy, "Duchenne") smile	Intent to play or affiliate
"False" smile (feigned happiness)	Display of courtesy, appeasement
"Sad" face	Recruitment of succor; display of surrender, damage or vulnerability to damage
"Anger" face	Readiness to attack
"Leaked" (inhibited) anger	Conflict between attacking and not attacking
"Fear" face	Readiness to submit or escape
"Contentment" face	Readiness to continue current situation / interaction
"Disgust" face	Intent to spew or analogously reject another
"Contempt" face	Display of superiority
"Poker" face (suppressed emotion)	Display of neutrality

Table 1: Two Views of Facial Expressive Behavior: BET's "Facial Expressions of Emotions" vs. BECV's Functional Social Tools

When participants are asked to match iconic BET expressions to functional redescriptions (e.g., "back off or I'll attack"), such redescriptions achieve matching rates equal to emotion terms (e.g. "anger"; Yik, 1999). Unlike emotion terms, however, these functional descriptors imply neither any particular internal state (e.g. one can solicit affiliation or play when happy or unhappy), nor any moral assignations about which signals are "honest" or "genuine" (e.g. a face recruiting succor is not "honest" because one is sad and dishonest when one is not). Such functional descriptions are predicated merely on the view that facial displays are only probabilistic signals of social intentions that would, in everyday life, be accompanied by the words, vocal prosodies, and gestures congruent with the intent.

According to BECV, facial displays serve as social tools. To wit, in accusing a relationship partner of committing an infidelity, one might exclaim, "You are a stinking, lying turd!" and supply the concordant tone of voice, an upturned nose, and the appropriate hand and finger gestures. All this sound and fury would force a nixing or resetting of the relationship. For BECV, understanding that the shock-and-awe display was a tool for relationship realignment is all it takes to explain why the signaling occurred. Any detour to *qualia* (or other internal proxy for emotion) as causal is extraneous because, in BECV, there is no necessary connection between those signals and any one emotion: the accuser/displayer may have been disgusted, contemptuous, devastated, livid – or relieved or thrilled, if the entire rejection drama was staged to divert the partner from discovering that he/she cheated first.

BET advocates objected to this interactional view of facial displays, noting that "Facial expressions do occur when people are alone … and contradict the theoretical proposals of those who view expressions solely as social signals" (Ekman, Davidson & Friesen, 1990, p. 351). It was necessary, therefore, to explain that being alone physically didn't imply that we were alone *psychologically*.

In this social media age, when people have their faces glued to their phones and begin and end relationships with right and left swipes, this explanation now seems obvious, but it was originally contentious. From the start, I had enumerated examples in which we were alone but implicitly social (Fridlund, 1991a): imagining or misbelieving that others are present (daydreams, flashbacks, or talking to someone who's left the room), grieving (when we crave reunion), sexual fantasy, soliciting an interaction (recruiting succor with a pained or crying face, as infants do), or preparing for one (rehearsing for a play or interview).

In all these cases, individuals may subvocalize – they are "talking to people in their heads" – and any accompanying "solitary" faces would be equally social. It makes no difference if the interactant is *myself*: If I scowl and tell myself, "Now Fridlund, don't screw up!", both my words (*sotto voce*) and accompanying face (*sotto facie*?) serve to keep Fridlund focused and out of trouble.

We showed this experimentally, with human studies that extended novel avian research by the much-missed Peter Marler (Marler, Duffy & Pickert, 1986a, b). We demonstrated *audience effects* in solitary smiling with audiences that were both explicit (friends were present) and implicit (participants were alone but believed friends were co-participants elsewhere), and with social vs. nonsocial imagery (Fridlund 1991, Fridlund et al., 1990, 1992). Several investigators have replicated such *implicit audience effects*, expanding the findings to infants, beyond smiling, and to augmenting vs. decrementing effects of friends vs. strangers (Hesse, Banse & Kappas, 1995; Jones, Collins & Hong, 1991; Schützwohl & Reisenzein, 2012; Wagner & Smith, 1991).

BET partisans dismissed these findings peremptorily: "No account should be taken of studies that do not distinguish between Duchenne and non-Duchenne smiles…" (Ekman & Keltner, 1997, p. 41). "Duchenne smiles," according to BET, were genuine, emotional, "felt" smiles, unlike other, intrinsically social smiles, which might be "false," "phony" or "unfelt" (Ekman & Friesen, 1982; Frank & Ekman, 1993; Frank, Ekman & Friesen, 1993). The criticism was entirely misplaced, since in the implicit-audience studies, the smiles in question varied substantially with sociality but were all emitted in solitude – which, for BET, would make them emotional and genuine (again, Ekman et al., 1990, p. 351).

As Ruth Leys noted (personal communication, March 5, 2015), Ekman soon changed course from dismissing these implicit-sociality findings to revising his theory to accommodate them: "I expect that some display rules are so well established that some people may follow them even when they are alone. And some people when alone may imagine the reactions of others, and then follow the appropriate display rule, as if the others were present. And finally, there may be display rules that specify the management of expression not just with others but when alone" (Ekman, 1997, p. 328). Notably, Ekman did not specify how one might ascertain when such "solitary display rules" were in effect and when they were not.

If Ekman's turnabout solved one problem, it opened up a bigger one. Prior to this change, Ekman contended that solitary facial behavior was free of display rules. Of the paradigmatic Japanese-American study cited most as a demonstration of the display-rules concept (Ekman, 1972; Friesen, 1972), Ekman summarized the findings: "In private, when no display rules to mask expression were operative, we saw the biologically based, evolved, universal facial expressions of emotion. In a social situation, we had shown how rules for the management of expression led to culturally different facial expressions" (Ekman, 1984, p. 321). With Ekman's expansion of BET to include solitary display rules, can it now be certain that the solitary faces observed in the Japanese-American study were display-rule-free and thus "biologically based, evolved, universal facial expressions of emotion"? If so, how would that be verified?

There are wider repercussions. Ekman's concession that private behavior may be conventional like our public behavior reduces considerably the distance between the claims posed by his neurocultural version of BET, and those struck earlier by the cultural relativists he so staunchly opposed, such as Margaret Mead and Ray Birdwhistell, who argued for the pervasiveness of cultural learning in all aspects of life.

Findings that solitary smiles could be "social" also seemed to violate BET's felt/false, Duchenne/non-Duchenne smile dichotomy. Can this dichotomy be sustained? I proposed early on that "Duchenne" smiles were actually conjoint displays of typical smiling *plus* tonic elicitation of the blink reflex of Descartes ("wincing"), the latter of which could occur

with any strong stimulus and not any specified emotional state (Fridlund, 1994).

Studies now indicate that, contrary to BET, Duchenne smiles are at least as affected by sociality as non-Duchenne ones (Crivelli, Carrera & Fernández-Dols, 2015; Fernández-Dols & Ruiz-Belda, 1995; Mehu, Grammer & Dunbar, 2007; Ruiz-Belda, Fernández-Dols & Barchard, 2003), that they can be produced deliberately (Gosselin, Perron & Beaupré, 2010; Gunnery & Hall, 2014; Gunnery, Hall & Ruben, 2013), and that their occurrence varies both with smile intensity (Krumhuber & Manstead, 2009) and stimulus intensity regardless of valence (Harris & Alvarado, 2005).

BECV rejects the idea that some display, or class of displays, can have intrinsic properties outside the context of its issuance. Smiles may be made by mothers toward children or assailants toward victims. Tears may flow in grief, retribution, reconciliation, or triumph. The meanings of these displays can be understood only by considering who makes them and when they occur.

In the neurocultural version of BET, however, morphology dictates not just emotionality but authenticity. Duchenne smiles are "genuine" because they are "felt," and disingenuous because they are "unfelt" or "false." This stark dichotomy turns everyday courtesy into mendacity. It also leads to futile diversions. A used-car salesman may be a consummate Duchenne smiler and scam nearly every customer who walks onto his lot. His winning Duchenne smiles sell cars. For BET, then, his smiles must be "felt." Is this what we care about, whether he's happy if he scams us?

For BECV, the "authenticity" of his smile lies not in what he feels, but in whether it predicts whether he will treat us fairly if we buy a car from him. More generally, we learn whose words and expressions are reliable indicators of their intent, and over time we bond with those individuals who prove reliable and avoid those who prove otherwise.

In deception, therefore, the "truth" of a display inheres neither in the display nor its displayer, but in the moving average by which a recipient continually calibrates and recalibrates the reliability of the signals issued in *that* context by *that* displayer. Greater predictability of displayers' signals and lower skepticism by recipients toward those signals naturally co-evolve with repeated cooperation, else breaches occur that force recalibration, confrontation, or termination of interaction (Mitchell & Thompson, 1986). The "leakage" seen by BET theorists as the breakout of "genuine emotion" through an outer mask is simply a momentary conflict in intentions in social negotiation (Fridlund, 1991a). This interactional perspective is decidedly anti-Darwin qua *Expression* but resoundingly Darwinian (Fridlund, 1992a).

Certain questions have been raised repeatedly about BECV. Does BECV deny "emotion"? Does BECV deny a privileged relationship between "emotion" and certain facial displays? Do "emotions" serve as "commitment devices" that reveal our authentic, internal states (Frank, 1988; and see crucial treatment of the emotion-as-commitment issue by Leys, 2013)? To BECV, all these questions mean little, because they hinge entirely on how one defines emotion (cf., Schattschneider, 1960; to paraphrase: defining the terms determines the outcome). Over a century's theory and research have demonstrated that "emotion" has proven intractable to consensual, let alone operational, definition.

BET theorists often identify "emotion," at least implicitly, with *qualia* or "feelings." For example, an observer may claim that someone "felt sad" and his sadness produced his "sad expression." In the neurocultural version of BET, "felt" ("Duchenne") smiles are "all smiles in which the person actually experiences … a positive emotion" (Ekman & Friesen, 1982, p. 242). Both the "sadness" and "positive emotion" contentions make *qualia* – or their putative proximal generators – causal, and both are untenable when they make accountable something ineffable and unverifiable.

But what if one *were* to localize the proximal generators for *qualia*, the "feeling centers," in the brain? Could we then say that changes in *qualia*, or those generators that produced the *qualia* changes, caused the associated events in the neuromuscular centers that produced the facial expressions? How does one ever determine that event A *causes* event B in the brain? I invite readers new to this question to Google "Libet's experiment" and discover the labyrinthine complexities in determining neurocausality.

One common BET recourse to according *qualia* strict agency and keep "emotion" scientific is to make facial expressions just part of the package of changes (neurochemical, behavioral, cognitive) that constitutes an emotion or "affect program," *qualia* being among them. On this view, the presence or absence of emotion cannot be determined by the

presence or absence of *qualia*, or of any other single component or subset of components.

This view reduces to no more than hand-waving about the knottiness of the phenomena and *ad hoc* choices of stipulated "emotion measures," with the result that surveys of research and formal meta-analyses continually find disappointing links between "emotion" and "expression" (cf., Ortony & Turner, 1990). Newer backstops include: (1) trying to re-objectify "emotion" as a neo-Kantian, categorical "conceptual act" that belongs more to the observer than the emoter (Barrett, Wilson-Mendenhall, & Barsalou, 2015), and (2) paradoxically trying to nail down the "emotion" concept by declaring it intrinsically fuzzy (Scarantino & Griffiths, 2011).

For BECV, all this reasoning is tendentious and wasteful if the purpose is to understand our facial displays. The same holds for ecumenical BET formulations that begin with emotion, variously defined, and end with how "everyone knows" that the expressions have social functions, too (e.g., Hauser, 1996). For BECV, displays evolved as social tools *directly*, not as parts of underlying mechanisms for the production of displays. Natural and cultural selection do not "care about" (specifically select for) the inner workings of traits, only the traits themselves.

Facial behaviors that aid individuals in navigating their social terrains (i.e., displays) will, via their displayers, tend to proliferate horizontally (i.e., culturally and geographically) and vertically (via genetic/epigenetic inheritance), regardless of what neural operations produce them; accompanying these displays is the coevolution of recipient behavior that is attentive yet skeptical (Krebs & Dawkins, 1984).

How has BECV fared against BET? James Russell's influential critique of the cross-cultural matching-to-sample studies (Russell, 1994), and his team's demonstration of powerful context effects in facial-expression perception (Carroll & Russell, 1996; Russell & Fehr, 1987), broke the paradigm lock BET had on facial-expression research. BECV's small contribution has been to supply a new framework for understanding our facial displays, one that restores Darwin's vision of human-animal continuity and places it on a solid evolutionary footing. I believe it's what Darwin *would* have proposed had he been able.

I am pleased by how much serious scholarly attention BECV has received. I grounded it in behavioral ecology and evolutionary theory, but Brian Parkinson's generous review reminded me of its debt to Dewey (Parkinson, 2005). With penetrating depth, Ruth Leys has shown how BECV can clarify philosophical and technical problems in the objectification and neural localization of emotion (Leys, 2007, 2010, 2011, 2014). BECV has informed research on both public and implicit-audience accounts of responses to social media (Litt, 2012), smiling in pain (Kunz, Prkachin, & Lautenbacher, 2013), human-computer communication (Aharoni & Fridlund, 2007), persuasion (Cesario & Higgins, 2008), power and dominance (Burgoon & Dunbar, 2006), facial displays in rats (Nakashima, Ukezono, Nishida, Sudo, & Takano, 2015) and chimpanzees (Parr & Waller, 2006), *intra*personal communication in therapeutic narrative writing (Brody & Park, 2004), and the game-theoretic analysis of human deception (Andrews, 2002).

Finally, José-Miguel Fernández-Dols and his colleagues have conducted a line of masterful studies showing how BECV can account for facial behavior in naturalistic settings (e.g., Crivelli et al., 2015; Fernández-Dols & Ruiz-Belda, 1995; Ruiz-Belda et al., 2003). It also seems that the *battle royale* between BET and BECV has liberated inquiry on facial expressions: investigators can now pursue hypotheses (e.g., genetic/epigenetic diversity in facial displays, facial dialects, infant deception) that, because they transgressed BET, were previously inconceivable or taboo.

BECV will always be a tough sell. It requires shaking off a romanticized view of human nature that makes the face a battleground between an "authentic self" and an impression-managed "social self" (Fridlund, 1994, 1996). The first concept we treasure; the second we concede reluctantly. To BECV, both are illusory. Like our words, voice and gestures, our facial displays – even those we make as infants, and which will be deployed by our android companions (will they have felt or false Duchenne smiles?) – are part of our plans of action in social commerce.

Acknowledgements

I am indebted to Jose-Miguel Fernández-Dols and Ruth Leys for comments and suggestions.

References

Aharoni, E., & Fridlund, A. (2007). Social reactions toward people vs. computers: How mere labels shape interactions. *Computers in Human Behavior*, *23*, 2175-2189.

Alcock, J. (1984). Animal behavior: An evolutionary approach (3rd. Ed.). Sunderland, MA: Sinauer.

Andrews, P. W. (2002). The influence of postreliance detection on the deceptive efficacy of dishonest signals of intent: Understanding facial clues to deceit as the outcome of signaling tradeoffs. *Evolution and Human Behavior*, *23*, 103-121.

Barrett, L. F., Wilson-Mendenhall, C. D., & Barsalou, L. W. (2014). The conceptual act theory: A road map. In L. F. Barrett and J. A. Russell (Eds.), *The psychological construction of emotion* (pp.83-110) New York: Guilford.

Block, N. J., Flanagan, O. J., & Güzeldere, G. (1997). *The nature of consciousness: Philosophical debates*. Cambridge: MIT Press.

Brody, L. R., & Park, S. H. (2004). Narratives, mindfulness, and the implicit audience. *Clinical Psychology: Science and Practice*, *11*, 147-154.

Browne, J. (1985), Darwin and the expression of the emotions. In D. Kohn (Ed.), *The Darwinian heritage* (pp. 307-326). Princeton: Princeton University Press.

Burgoon, J. K., & Dunbar, N. E. (2006). Nonverbal expressions of dominance and power in human relationships. *Sage handbook of nonverbal communication* (pp. 279-297). Thousand Oaks: Sage.

Caro, T. M. (2005). *Antipredator defenses in birds and mammals*. Chicago: University of Chicago Press.

Carroll, J. M. & Russell, J. A. (1996). Do facial expressions express specific emotions? Judging emotion from the face in context. *Journal of Personality and Social Psychology*, *70*, 205-218.

Cesario, J., & Higgins, E. T. (2008). Making message recipients “feel right”: How nonverbal cues can increase persuasion. *Psychological Science*, *19*, 415-420.

Chalmers, D. (1995). Facing Up to the Problem of Consciousness. *Journal of Consciousness Studies*, *2*, 200–219.

Crivelli, C., Carrera, P., & Fernández-Dols, J.M. (2015). Are smiles a sign of happiness? Spontaneous expressions of judo winners, *Evolution and Human Behavior*, *36*, 52-58.

Darwin, C. R. (1859). *On the origin of species, or the preservation of favoured races in the struggle for life*. London: Murray.

Darwin, C.R. (1872). *The Expression of the Emotions in Man and Animals*. London: Murray.

Darwin, F. (Ed.) (1887). *The life and letters of Charles Darwin, including an autobiographical chapter*. (Vols. 1 and 2). London: Murray.

Davies, N. B., Krebs, J. R., & West, S. A. (2012). *An introduction to behavioral ecology* (4th Ed.). Oxford: Wiley-Blackwell.

Ekman, P. (1972). Universals and cultural differences in facial expressions of emotion. In J. Cole (Ed.), *Nebraska Symposium on Motivation, 1971* (Vol. 19), (pp. 207-282). Lincoln, NE: University of Nebraska Press.

Ekman, P. (1997). Expression or communication about emotion. In N. L. Segal, G. E. Weisfeld, & C. C. Weisfeld (Eds. *Uniting Biology and Psychology: Integrated Perspectives on Human Development* (Pp. 315-338). Washington, D.C.:

APA Press.

Ekman, P., Davidson, R. J., & Friesen, W. V. (1990), The Duchenne smile: Emotional expression and brain physiology II. Journal of Personality and Social Psychology, 58, 342-353.

Ekman, P., & Fridlund, A. J. (1987). Assessment of facial behavior in affective disorders. In J. D. Maser (Ed.), *Depression and expressive behavior*. Hillsdale, New Jersey: Erlbaum.

Ekman, P. & Friesen, W. V. (1969). The repertoire of nonverbal behavior: Categories, origins, usage, and coding. *Semiotica, 1,* 49-98.

Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, *17*, 124-129.

Ekman, P., & Friesen, W. V. (1982). Felt, false, and miserable smiles. *Journal of Nonverbal Behavior*, *6*, 238–258.

Ekman, P., & Keltner, D. (1997). Universal facial expressions of emotion: An old controversy and new findings. In U. Segerstrâle & P. Molnár (Eds.), *Nonverbal communication: Where nature meets culture* (pp. 27-46). Mahway, N. J.: Erlbaum.

Ekman, P., Sorenson, E. R., & Friesen, W. V. (1969). Pan-cultural elements in facial displays of emotions. *Science*, *164*, 86-88.

Fernández-Dols, J.M., & Ruiz-Belda, M.A. (1995). Are smiles a sign of happiness? Gold medal winners at the Olympic Games. *Journal of Personality and Social Psychology*, 1995, *69*, 1113-1119.

Frank, M. G., & Ekman, P. (1993). Not all smiles are created equal: The differences between enjoyment and nonenjoyment smiles. *Humor: International Journal of Humor Research*, *6*, 9-26.

Frank, M. G., Ekman, P., & Friesen, W. V. (1993). Behavioral markers and recognizability of the smile of enjoyment. *Journal of Personality and Social Psychology*, *64*, 83–93.

Frank, R. H. (1988). *Passions within reason: The strategic role of the emotions*. New York: Norton.

Fridlund, A. J. (1991a). Evolution and facial action in reflex, social motive, and paralanguage. *Biological Psychology*, *32*, 3-100.

Fridlund, A. J. (1991b). The sociality of solitary smiles: Effects of an implicit audience. *Journal of Personality and Social Psychology*, *60*, 229-240.

Fridlund, A. J. (1992a), Darwin's Anti-Darwinism in *The Expression of the Emotions in Man and Animals*. In K. Strongman (Ed.), *International review of emotion*, Vol. 2.

Fridlund, A. J. (1992b). The behavioral ecology and sociality of human faces. In M. S. Clark (Ed.), *Review of Personality and Social Psychology*, *13*, 90-121. Newbury Park, CA: Sage.

Fridlund, A. J. (1994). *Human facial expression: An evolutionary view*. San Diego, CA: Academic Press.

Fridlund, A. J. (1997). The new ethology of human facial expressions. In J. A. Russell & J.-M. Fernandez-Dols (Eds.), *The psychology of facial expression* (pp. 103-129). Cambridge: Cambridge University Press.

Fridlund, A. J. (2002). The behavioral ecology view of smiling and other facial expressions. In M. Abel (Ed.), *An empirical reflection on the smile* (pp. 45-82). New York: Edwin Mellen Press.

Fridlund, A. J., Ekman, P., & Oster, H. (1988). Emotions and facial expressions. In A. Kendon (Ed.), *International en-*

cyclopedia of communications. Philadelphia: Annenberg School of Communications/Oxford University Press.

Fridlund, A. J., & Duchaine, B. (1996). 'Facial Expressions of Emotion' and the delusion of the hermetic self. In R. Harré & W. G. Parrott, *The emotions* (pp. 259-284). Cambridge: Cambridge University Press.

Fridlund, A. J., & Izard, C. E. (1983). Electromyographic studies of facial expressions of emotions and patterns of emotions. In J. T. Cacioppo & R. E. Petty (Eds.), *Social psychophysiology: A sourcebook* (pp. 243-286). New York: Guilford Press.

Fridlund, A. J., Kenworthy, K., & Jaffey, A. K. (1992). Audience effects in affective imagery: Replication and extension to dysphoric imagery. *Journal of Nonverbal Behavior*, *16*, 191-212.

Fridlund, A. J., & Russell, J. A. (2006). The functions of facial expression: What's in a Face? *Sage handbook of nonverbal communication* (pp. 299-319). Thousand Oaks: Sage.

Fridlund, A. J., Sabini, J. P., Hedlund, L. E., Schaut, J. A., Shenker, J. I., & Knauer, M. J. (1990). Social determinants of facial expressions during affective imagery: Displaying to the people in your head. *Journal of Nonverbal Behavior*, *14*, 113-137.

Fridlund, A. J., Schwartz, G. E., & Fowler, S. C. (1984). Pattern-recognition of self-reported emotional state from multiple-site facial EMG activity during affective imagery. *Psychophysiology*, *21*, 622-636.

Gosselin, P., Perron, M., & Beaupré, M. (2010). The voluntary control of facial action units in adults. *Emotion*, *10*, 266–271.

Gruber, H. E., with Barnett, H. P. (1974). *Darwin on man: A psychological study of scientific creativity* . New York: Dutton.

Gunnery, S. D., & Hall, J. (2014). The Duchenne smile and persuasion. *Journal of Nonverbal Behavior*, 38, 181-194.

Gunnery, S. D., Hall, J. A., & Ruben, M. A. (2013). The deliberate Duchenne smile: Individual differences in expressive control. *Journal of Nonverbal Behavior*, 37, 29-41.

Harris, C. R., & Alvarado, N. (2005). Facial expressions, smile types, and self-report during humor, tickle, and pain. *Cognition and Emotion*, *19*, 655-669.

Hauser, M. (1996). *The evolution of communication*. Cambridge: MIT Press.

Hess, U., Banse, R., & Kappas, A. (1995). The intensity of facial expression is determined by underlying affective state and social situation. *Journal of Personality and Social Psychology*, *69*, 280-288.

Hinde, R. A. (1985a). Expression and negotiation. In G. Zivin (Ed.), *The development of expressive behavior* (pp. 103-116). Orlando, FL: Academic Press.

Hinde, R. A. (1985b). Was 'The Expression of the Emotions' a misleading phrase? *Animal Behaviour*, *33*, 985-992.

Izard, C. E. (1971). *The face of emotion*. New York: Appleton-Century-Crofts.

Jones, S. S., Collins, K., & Hong, H.-W. (1991). An audience effect on smile production in 10-month-old-infants. *Psychological Science*, *2*, 45-49.

Krebs, J. R., & Davies, N. B. (1987). *An introduction to behavioral ecology* (2nd Ed.). Sunderland, MA: Sinauer.

Krebs, J. R., & Dawkins, R. (1984). Animal signals: Mind-reading and manipulation. In J. R. Krebs & N. B. Davies (Eds.), *Behavioural ecology* (2nd. Ed.) (pp. 380-402). Oxford: Blackwell.

Krumhuber, E. G., & Manstead, A. S. R. (2009). Can Duchenne smiles be feigned?: New evidence on felt and false smiles. *Emotion*, *9*, 807-820.

Kunz, M., Prkachin, K., & Lautenbacher, S. (2013). Smiling in pain: Explorations of its social motives. *Pain Research and Treatment*, doi:10.1155/2013/128093.

Leys, R. (2007). *From guilt to shame: Auschwitz and after*. Princeton: Princeton University Press.

Leys, R. (2010). How did fear become a scientific object and what kind of object is it? *Representations*, *110*, 66-104.

Leys, R. (2011). The turn to affect: A critique. *Critical Inquiry*, *37*, 434-472.

Leys, R. (2014). 'Both of us disgusted in my insula': Mirror neuron theory and emotional empathy. In F. Biess & D. M. Gross (Eds.), *Science and emotions after 1945: A transatlantic perspective* (pp. 67-95). Chicago: University of Chicago Press.

Leys, R. (2013). A world without pretense? Honest and dishonest signaling in social life. In C. Mayo (Ed.), *Philosophy of Education 2013* (pp. 25-42). Urbana, Illinois: Philosophy of Education Society.

Litt, E. (2012). Knock, knock. Who's there? The imagined audience. *Journal of Broadcasting & Electronic Media*, *56*, 330-345.

Lorenz, K. Z. (1967), The biology of expression and impression, *Psychologische Forschung*, *37.*

Lorenz, K. Z. (1970). *Studies on animal and human behavior* (Vols. 1 and 2). Cambridge, MA: Harvard University Press.

Marler, P. R., Duffy, A., & Pickert, R. (1986a). Vocal communication in the domestic chicken: I. Does a sender communicate information about the quality of a food referent to a receiver? *Animal Behaviour*, *34*, 188-193.

Marler, P. R., Duffy, A., & Pickert, R. (1986b). Vocal communication in the domestic chicken: II. Is a sender sensitive to the presence and nature of a receiver? *Animal Behaviour*, *34*, 194-198.

Matsumoto, D., Ekman, P., & Fridlund, A. J. (1990). Analyzing nonverbal behavior. In P. Dowrick (Ed.), *A practical guide to using video in the behavioral sciences*. New York: Wiley.

Maynard Smith, J. (1982). *Evolution and the Theory of Games*. Cambridge: Cambridge University Press.

Mehu, M., Grammer, K., & Dunbar, R. I. M. (2007). Smiles when sharing. *Evolution and human behavior*, *28*, 415-422

Mitchell, R. W., & Thompson, N. S. (Eds.) (1986). *Deception: Perspectives on human and nonhuman deceit*. Albany: SUNY Press.

Nakashima, S. F., Ukezono, M., Nishida, H., Sudo, R., & Takado, Y. (2015). Receiving of emotional signal of pain from conspecifics in laboratory rats. *Royal Society Open Science*, doi: 10.1098/rsos.140381

Parkinson, B. (2005). Do facial movements express emotions or communicate motives? *Personality and Social Psychology Review*, *9*, 278-311.

Parr, L. A., & Waller, B. M. (2006). Understanding chimpanzee facial expression: Insights into the evolution of communication. *Social Cognition and Affective Neuroscience*, *1*, 221-228.

Ruiz-Belda, M.A., Fernández-Dols, J. M., Carrera, P., & Barchard, K. (2003). Spontaneous facial expressions of happy bowlers and soccer fans. *Cognition and Emotion*, *17*, 315-326.

Russell, J. A. (1994). Is there universal recognition of emotion from facial expression? *Psychological Bulletin*, *115*,

102-141.

Russell, J. A., & Fehr, B. (1987). Relativity in the perception of emotion in facial expressions. *Journal of Experimental Psychology: General*, *116*, 223-237.

Scarantino, A., & Griffiths, P. (2011). Don't give up on basic emotions. *Emotion Review*, *3*, 1-11.

Schattschneider, E. E. (1960). *The semisovereign people*. New York: Holt, Rinehart, & Winston.

Schützwohl , A., & Reisenzein, R. (2012). Facial expressions in response to a highly surprising event exceeding the field of vision: a test of Darwin's theory of surprise. *Evolution and human behavior*, *33*, 657-664.

Schwartz, G. E., Fair, P. L., Salt, P., Mandel, M. R., & Klerman, G. L. (1976). Facial muscle patterning to affective imagery in depressed and nondepressed subjects. *Science*, *192*, 489-491.

Smith, W. J. (1977). *The behavior of communicating*, Cambridge, MA: Harvard University Press.

Tinbergen, N. (1952). "Derived" activities: their causation, biological significance, origin and emancipation during evolution, *Quarterly Review of Biology*, *27*, 1-32.

Tinbergen, N. (1953). *Social behaviour in animals*. London: Chapman and Hall.

Wagner, H. L., & Smith, J. (1991). Social influence and expressiveness. *Journal of Nonverbal Behavior*, *15*, 201-214.

Yik, M. (1999). Interpretation of faces: A cross-cultural study of a prediction from Fridlund's theory. *Cognition and Emotion*, *13*, 93-104.

Moving on from the Basic Emotion Theory of Facial Expressions

James A. Russell, Department of Psychology, Boston College

Jim Russell

August 2015 – People frown, smile, laugh, grimace, wince, scowl, pout, sneer, and so on. In turn, observers interpret facial muscle movements, inferring what the expresser is doing (thinking, feeling, perceiving, faking, and so on). Basic Emotion Theory (BET) offered an account of certain facial movements and their interpretation in terms of discrete emotions. Here I offer a skeptical view of BET's prospects.

BET is an elaboration of a folk theory that dates back at least to Aristotle. As such, it captures many of our commonsense, taken-for-granted presuppositions about facial expressions – presuppositions that underlie the way those of us in the Western tradition think about and perceive facial movements and that make certain claims seem obvious. Adding an evolutionary account, a neural mechanism, and a famous trek in the highlands of Papua New Guinea made BET a highly influential and plausible theory. BET became the dominant research program in the field of affective science and stimulated much valuable research.

A scientific theory often begins with a folk theory, but then changes as nature is probed for unpredicted facts and anomalies and conceptual problems in the theory. A clear example of this development comes from physics. Aristotle based his physics on the folk theory of the four elements, but observations and analyses led eventually to the qualitatively different physics of today. How far from obvious are nature's ways.

BET suffers from unresolved conceptual issues, and observations and experiments have uncovered unpredicted facts and anomalies about faces that demand a similar move beyond folk theory and BET. Today, researchers must examine non-emotional aspects of facial movements and their interpretations (see Figure 1).

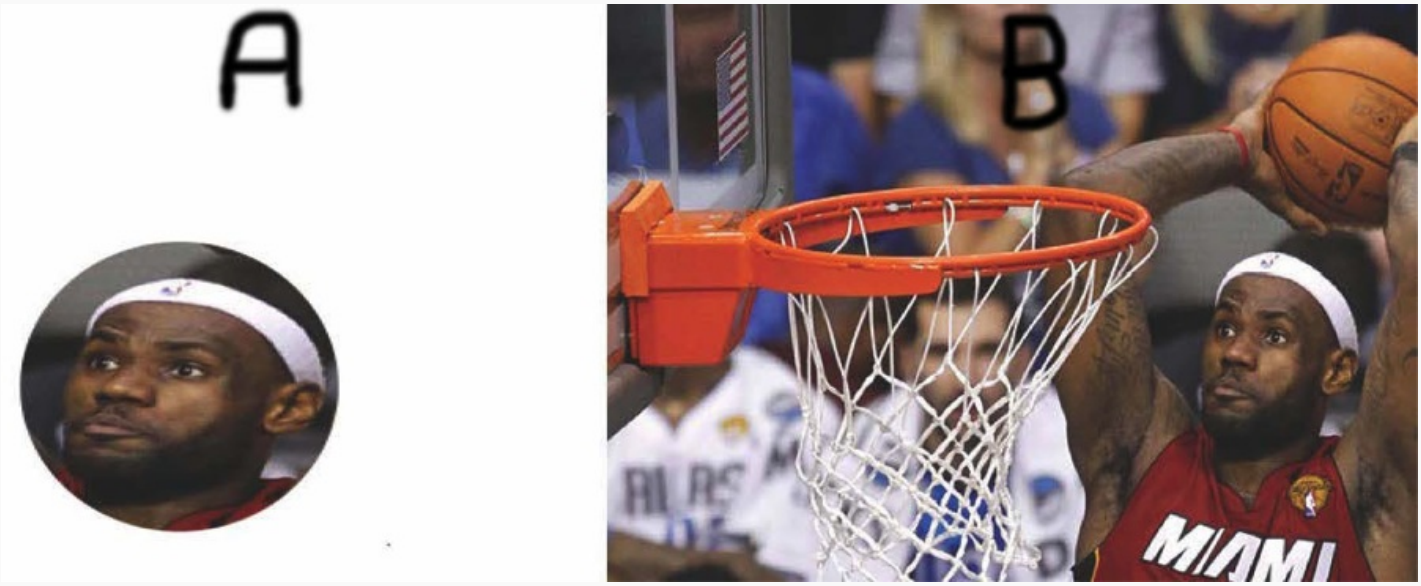


Figure 1: Neither production nor recognition of facial expressions conforms to Basic Emotion Theory. In panel A is a photograph of a spontaneous facial movement that would be scored as an expression of surprise by Basic Emotion Theory. In panel B is the same facial expression shown in its actual context. The photograph is of LeBron James, a professional basketball player, looking up at the basketball hoop. It is unlikely that James is surprised to find a basketball hoop on the court, and it is unlikely that observers would interpret James as surprised when they see the context in which his facial expression occurred.

Even with respect to the role of emotion, researchers must choose between revising BET or, as I suggest, take a different approach entirely. We must separate issues of the sender's production of facial movements from the issues of an onlooker's interpretation of those movements. After all, we perceive melancholy in the baying of wolves and joy in birdsong; we cannot always use what we perceive to infer the true cause.

The Sender's Production of Facial Movements

Faces move, obviously. We need a descriptive system of facial movements. Ekman, Friesen, and Hager's (2002) elaboration of Hjortsjö's (1969) anatomically-based catalog of facial movements was a major advance. Still, much (but not all) of the research inspired by BET has focused on a small number of exaggerated facial configurations. How often the facial configurations seen in, for example, Ekman and Friesen's (1975) *Pictures of Facial Affect* actually occur remains unknown, but they are likely rare.

Gaspar and Esteves (2012) recorded the facial behavior of 3-year-olds during emotional episodes. They found much facial movement, but rarely the configurations seen in the prototypical BET faces. Configurations "matching the prototypical expression of joy/happiness are the highest, reaching 27% . . . The surprise matching proportion is 5%, anger 0%, and fear 11%" (p. 353). Carroll and Russell (1997) found similar results with adults. We need to go beyond the facial configurations seen in *Pictures of Facial Affect.*

We also need an account of what produces facial movements. BET follows folk wisdom in presupposing that, except in cases of deliberate deception, happiness makes us smile, anger makes us frown, fear makes us gasp, disgust makes us scrunch our noses, and so on. Surprisingly little evidence supports the production side of BET's account.

Reporting the "first evidence" alleged to support the emotion-face link, Rosenberg and Ekman (1994, p. 223) wrote, "Our results provide the first evidence that there is coherence between facial expression and self-report of emotion at specific moments." Viewers of one (of four) film clips of a disgusting event had a significantly higher probability (.50 vs .30) of showing a facial expression of a specific emotion at the moment in the film that they reported having felt that emotion than at other moments. Analysis of a second film clip failed to replicate this result. The study (a) was correlational (thereby unable to test causality), (b) failed to include an analysis of two of the four clips shown, and (c) failed to specify precisely which facial expressions were scored as corresponding to which emotion.

Improved research on the emotion-face link followed, but continued to find evidence at odds with folk wisdom and BET. Reisenzein, Studtmann, and Horstmann (2013) reviewed the laboratory evidence, Fernandez Dols and Crivelli (2013) the field evidence. In brief, happy people do not always smile, and smiles occur without happiness. Smiles are easily posed, do not always correlate with the smiler's emotional state (Fridlund, 1991; Krumhuber & Manstead, 2009), and can be caused by negative experiences such as losing a game (Schneider & Josephs, 1991), being embarrassed (Keltner), or being in pain (Kunz, Prkachin, & Lautenbacher, 2009). Similar problems arise for other emotion-face associations.

We need to explore other possible sources of facial movement both for the complete story of how facial expressions are produced and as a way to test BET. As BET agrees, the sources of human facial movements are many. As we talk, eat, breathe, exert effort, smell, feel pain, or reach orgasm – our faces move. Our faces move as part of certain reflexes (gag, orienting, startle, and so on), of perception (looking, tasting, and so on), and of social interaction (social greeting, threatening, exerting dominance or submission). Our faces move as we unconsciously imitate others. Our faces move as part of information processing and of subsequent behavior. All such sources of movement are potential confounds when testing BET's assumption that discrete emotions cause facial movements.

Besides BET, there are various possible accounts of the production of facial movement, including the following: (1) Perception involves bodily movements (reaching to feel, turning to look), and facial movements are part of this process. For example, BET's "fear expression" might enhance visual exposure (Susskind et al., 2008). (2) Cognitions (appraisals of current events) might produce facial movement (Scherer, 1992). Ortony and Turner (1990) noted that a frown (brow contraction) often occurs when one is uncertain or puzzled. (3) Fridja proposed that facial movements are part of the preparation for action. (4) As social animals, a large part of our behavior is negotiating social interaction. Fridlund

(1994) suggested that facial movements signal to an audience projected plans and goals including contingencies. (5) Facial movements are part of paralanguage. Chovil (1991) offered a taxonomy for paralanguage in which facial movements are part of speech communication. An example is substituting a “disgust face” for the words “that stinks.” (6) Core affect – a neurophysiological state consciously accessible as simply feeling good or bad, energized or quiescent – might produce facial movement.

Conceivably, all these accounts, including BET, are complementary. Certainly, some of the six proposals listed above maintained some link to emotion (appraisal, action preparation, and core affect have been listed as components of an emotion). But science requires a more critical stance. In evaluating BET, the question is whether one or more of these alternative sources better account for facial movements. Some of these suggested sources of facial movement are likely correlated with emotional state, and the question is what happens when they are disentangled.

Kraut and Johnston’s (1979) study of smiling bowlers is the prototype. They agreed that people often smile when happily interacting with others, but asked what happens when happiness and interacting are teased apart. Smiles when happy but not interacting were found to be rare (see also Fernandez Dols & Ruiz-Belda, 1995, and Ruiz-Belda, Fernández Dols, Carrera, & Barchard, 2003). (The objection that we smile at pleasant thoughts when alone was answered by Fridlund, 1994, who provided various reasons to believe that the smiler may be physically but not psychologically alone.) Thus, from a scientific perspective, research on alternative sources of facial movement provides a needed test of BET. And, so far, BET’s prospects are not good.

In short, the production of facial expressions is sometimes correlated with discrete emotions, although weakly, but there are alternative explanations to the theory that the emotions are causal, since emotions are confounded with other sources. Thus, we have no convincing evidence that emotions cause facial movements: the (weak) correlation between emotions and facial movements may have other underlying causes.

The Observer’s Interpretation of Facial Movements

We open our eyes and see that this person is happy, that one angry, and so on. BET articulated the common belief that people “recognize” happiness, anger, disgust, and so on in the faces of others. Many studies purported to demonstrate consensual recognition by asking people to match a photo of a static facial expression to one of BET’s predicted emotion terms. Such demonstrations, even if reliable, would not show that people spontaneously recognize the predicted emotion but that, once told that one of a number of emotions is expressed, they can select the predicted one. In other words, “emotion recognition” scores are merely matching-to-sample scores.

Even more troubling, the high matching scores found may be partly due to design methods that favored finding them. No single design problem need be fatal, but cumulatively they combine to push scores in the predicted direction: within-subjects designs, posed exaggerated facial expressions (devoid of voice, motion, body, and information about the expresser’s context), and the use of forced-choice response format (Russell, 1994). For example, when observers see spontaneous rather than posed faces, matching scores plummet. We recently found that people can achieve a high matching score between a label and a face, without recognizing any emotion. Instead, they used an elimination strategy: after matching several standard faces with standard labels, both children and adults chose a non-word, “pax,” from the list as the emotion expressed by a novel face (DiGirolamo & Russell, 2014; Nelson & Russell, 2014). If so, then such an elimination strategy may account for high matching found for some (but not all) emotion labels.

Outside the laboratory, the observer does not use someone’s facial expression alone to infer that person’s emotion, but facial expression in light of the expresser’s situation and other aspects of the face’s context including the expresser’s body (Fantoni & Gerbino, 2014). So, removing the context in a “recognition” experiment stands in the way of understanding how observers typically interpret facial expressions. More important, specifying context as well as face in such experiments can provide a test of BET.

BET implies that the facial expression is more powerful for “recognition” of emotion than is its context because BET theorizes that the facial expression is an automatic signal of the specific emotion (or that facial expression is part of that emotion), whereas context can provide only probabilistic information because different individuals respond differently to

the same situation. To the contrary, in determining the emotion seen by the observer, context is more powerful than the face (Carroll & Russell, 1996): a person in an anger-inducing situation who showed BET's "fear face" was interpreted as angry rather than afraid.

I also followed folk theory in predicting that, according to my valence-based theory of facial expressions, face trumps context on the judgment of valence (whether the expresser's emotion is seen as pleasant or unpleasant). Alas, I was wrong: context trumps face even on judgments of valence (Aviezer et al., 2008; Kayyal, Widen, & Russell, 2015).

In the "universality thesis," BET emphasized the uniformity of recognition: basic emotions were claimed to be easily recognized from the predicted facial expressions by all people whatever their culture, language, or education. Yet, meta-analyses have found that matching scores vary with culture, language, and education (Nelson & Russell, 2013; Trauffer, Widen, & Russell 2013). Jack et al. (2012) used a psychophysical technique and again found cultural differences in what facial configurations were matched to specific emotions.

BET presupposed that the English words *fear, anger, disgust*, and so on express universal categories in terms of which recognition proceeds; evidence indicates that the way in which emotions are categorized is not universal: emotion categories expressed in different languages are in some ways similar to but in some ways different from those in English (Russell, 1991; Wierzbicka, 1999).

As Ekman and Friesen (1971) emphasized, the most telling test of universality involves societies remote from Western culture and media. The few such studies showed a large cultural difference in matching scores (Russell, 1994). In a recent study of a remote society, Gendron, Roberson, van der Vyver, and Barrett (2014) similarly found weak to non-existent support for BET's prediction of uniformity of interpretation of facial expressions. Diversity needs our attention as much does as uniformity.

Some writers emphasize that BET's hypotheses are supported to a statistically significant degree: observers select BET's predicted emotion label more often than they would if they chose emotion labels randomly. But then no one predicts that humans are random in interpreting faces. Ruling *out* the null hypothesis of random responding does not rule *in* the experimenter's hypothesis. There are many ways to explain non-random responding; Russell (1994) offered eight alternative accounts, and surely there are more. (Aristotle's physics based on the four elements makes some valid predictions: put earth, water, and air in a beaker, shake, and watch the elements settle: earth at the bottom, water in the middle, and air at the top – just as his theory predicts.) Folk theories and the scientific theories inspired by them provide first approximations, not random associations.

What the classic BET studies called "recognition" is interpretation. Observers may use facial information to make inferences not just about emotion but about any psychological state. The interpretation of the face is influenced by many factors, some rarely studied (color of the sclera), some more studied: by the observer's situation (state, interests, motives), by the face's context (the expresser's context, words, gaze, vocal prosody, body position and proxemics, motor behavior, underlying physiognomy), and by features of the experimental method. Further, the observer does more than interpret. Rendall, Owren, and Ryan (2009) suggested that some facial movements influence the emotional state of the observer directly: receiving a smile might simply make you feel better.

I suggested an alternative account – called minimal universality – of an onlooker's interpretation of facial expressions (Russell, 1995). Universally, humans perceive others in simple general terms (valence and arousal): Is the person feeling good or bad, energized or quiescent? This part of the proposal is consistent with above-chance matching of faces with emotion labels, because the meaning of an emotion label includes, among other elements, valence and arousal. (This part of the proposal is also consistent with Osgood's theory that we perceive everything in terms of simple affective dimensions of evaluation and activity. And he may well be correct that we perceive facial movements in terms of potency as well.)

Young children interpret faces in terms of valence (Widen and Russell, 2008). For example, the typical young 3-year old uses the same one label (typically *angry*) for four of BET's canonical faces: those for fear, anger, sadness, and disgust. As children develop, they add new emotion concepts by differentiating: feeling bad is divided into feeling bad because o

loss vs. feeling bad because of receiving a hostile action. The end product is a set of adult emotion concepts, which are similar but not uniform across individuals, languages, and cultures (Russell, 1991). In interpreting facial expressions, older children and adults go beyond valence and arousal, including categorization by discrete emotions. On my initial proposal, the face is typically relied on to provide the values of valence and arousal, but context provides the specific emotion. The hypothesis that the face provides valence, however, was recently found wanting, as I reported above.

In short, sufficient evidence has now accumulated to conclude that BET's claims about universal recognition of a specific discrete emotion from its facial expression are unwarranted. Research should shift to the broader topic of how a person's facial movement influences an observer, including, but not limited to, the interpretation that the observer makes for the face and the many factors that influence that interpretation. We need to study not just English folk terms for emotion (*happiness*, *anger, disgust*, etc.) but many more psychological categories and how their accessibility or even existence varies with language and culture.

Can Basic Emotion Theory Be Salvaged?

One response to the evidence mentioned here might be to revise BET. This tack appears less viable in light of evidence on other aspects of the theory. There is no consensually agreed upon confirmatory evidence for emotion-specific signatures in the autonomic nervous system (Cacioppo et al., 2000) or specific behavioral responses (Baumeister, Vohs, DeWall, & Zhang, 2007). BET predicts tight coherence among each emotion's components, but such components turn out to be surprisingly weakly correlated (Reisenzein, 2000).

Caution is also warranted when revising BET because the revision may introduce problems as much as solutions. For example, evidence of cultural differences led Ekman (1972) to embrace Klineberg's (1938) hypothesis of cultural rules prescribing or proscribing facial expressions. On Ekman's treatment, these display rules render his theory immune to evidence: Happiness leads to smiles, except when it doesn't, in which case a display rule intervened. Without a prior specification of the display rules, no evidence could falsify the theory.

There are also deeper problems with BET. Modern understanding of evolution by natural selection raises doubts about BET and provides an alternative (Buss, 2014; Fridlund, 1994). Automatic signaling of one's true emotion to enemies would incur heavy costs, and evolution is likely to have produced deceptive as well as veridical signs because of conflic of interest between expresser and observer.

BET's problems are deeper still. I do not know exactly how BET defines emotion. On one interpretation, emotion is a package of components. At least in the Western cultural tradition, we tend to "see" emotions by packaging together various components. Indeed, the key concepts in BET (anger, fear, etc.) originated in folk psychology, concepts that are vaguely defined, heterogeneous, culture-specific, and permeated with questionable assumptions. A similar tendency can be seen when ancient astronomers "saw" constellations made up of stars that were actually unrelated cosmologically. Packaging disparate phenomena into a discrete emotion may make the world seem simpler and serve cognitive economy, but the packages may be merely convenient fictions.

On another interpretation, an emotion is an entity that causes the components (e.g., Tomkins', 1962-63, affect program): Emotion makes us flee, makes our heart race, makes us feel a certain way, and moves our faces. The "affect program" is simply a metaphor from computers to the brain. If the affect program is a hypothesized brain circuit dedicated to a specific emotion and only that emotion, then it is relevant that neuroscientists are abandoning the notion of hardwired emotion-specific brain circuits (LeDoux, 2012, 2014; Lindquist et al. 2012). The theory that an observable emotional component is explained by an affect program is reminiscent of faculty psychology in which an observable event is explained by a faculty of the same name: remembering is explained by the memory faculty, imagining by the imagination faculty, and moral behavior by the morality faculty.

In short, BET initially seemed plausible, even obvious, built as it was on our intuitive folk theory about emotions and faces, combined with an early understanding of brain mechanisms and of evolution by natural selection. Subsequent scientific scrutiny, however, has not supported its predictions. Its evolutionary presuppositions and neural basis lack support. Hypotheses about peripheral physiology and instrumental behavior also lack support. Co-occurrence of em-

otional components has been found much less frequent than predicted.

Alternative Approaches to Emotion

As it often happens with scientific progress, conceptual alternatives to BET begin with different assumptions and tend to be more complex and less intuitive, because they part ways with folk theory. Examples are Fridlund's (1994) behavioral ecology view based on modern evolutionary theory and Scherer's (1992) and Ortony & Turner's (1990) appraisal theories based on links between perception-cognition and specific muscle movements.

In psychological construction (Russell, 2003; Barrett and Russell 2014), I offer an alternative account of emotion and other affective phenomena that explicitly abandons certain common sense presuppositions, although it retains all the observable facts. People get angry or scared, obviously. Such folk terms as "emotion," "anger," and "fear" point to important phenomena, and the terms express concepts that often play a role in those phenomena. All the same, the question is how to develop a scientific account of those phenomena.

On my proposal, the term "emotion" is treated as a folk rather than a scientific term. Episodes called "emotional" consist of changes in various component processes (peripheral physiological changes, appraisals and attributions, expressive and instrumental behavior, subjective experiences), no one of which is itself an emotion or necessary or sufficient for an emotion to be instantiated. Emotion is not invoked as the cause of the components nor as the mechanism that coordinates the components. Each component has its own semi-independent causal process.

One hypothesis, for example, is that the production of facial expressions is accounted for by one or more of the six alternative sources discussed above, not by a discrete emotion or affect program dedicated exclusively to emotion or to a specific emotion. Facial "expression" is at most modestly correlated with other components of the emotional episode. The components are coordinated, as are all human processes, but, again, not by an affect program. Although emotion is not an entity causing the components, still, a witness, scientist, or the person having the emotion might categorize the episode as a specific emotion: we see emotions in others and experience emotions in ourselves. That categorization too is a process to be studied, and is neither necessary nor sufficient for an emotion to be instantiated.

Psychological construction abandons the assumption that emotional episodes are pre-fabricated; it proposes instead that they are assembled in the moment to suit current circumstances. An emotional episode is not qualitatively different from any other behavioral episode, and it is assembled in the same way as is any other behavioral episode, although often with a more extreme dose of valence and arousal.

References

Aviezer, H., Hassin, R. R., Ryan, J., Grady, C., Susskind, J., Anderson, A., Moscovitch, M., & Bentin, S. (2008). Angry, disgusted, or afraid? Studies on the malleability of emotion perception. *Psychological Science*, *19*(7), 724-732.

Barrett, L. F., & Russell, J. A. (Eds.), *The psychological construction of emotion*. New York: Guilford.

Baumeister, R. F., Vohs, K. D., DeWall, C. N., & Zhang, L. (2007). How emotion shapes behavior: Feedback, anticipation, and reflection, rather than direct causation. *Personality and Social Psychology Review*, *11*(2), 167-203.

Buss, D. M. (2014). Comment: Evolutionary criteria for considering an emotion "basic": Jealousy as an illustration. *Emotion Review*, *6*(4), 313-315.

Cacioppo, J. T., Berntson, G. G., Larsen, J. T., Poehlmann, K. M., & Ito, T. A. (2000). The psychophysiology of emotion. *Handbook of emotions*, *2nd edition*, pp. 173-191. New York: Guilford.

Carroll, J. M., & Russell, J. A. (1996). Do facial expressions signal specific emotions? Judging emotion from the face in context. *Journal of Personality and Social Psychology*, *70*(2), 205.

Carroll, J. M., & Russell, J. A. (1997). Facial expressions in Hollywood's portrayal of emotion. *Journal of Personality and Social Psychology, 72,* 164-176.

Chovil, N. (1991). Discourse-oriented facial displays in conversation. Research on Language and Social Interaction, 25, 163-194.

DiGirolamo, M. A. & Russell, J. A. (2014). The emotion seen in a face as a methodological artifact: The process of elimination hypothesis. Ms submitted.

Ekman, P. (1972). Universal and cultural differences in facial expressions of emotions. In J. K. Cole (Ed.), *Nebraska symposium on motivation, 1971* (pp. 207-283). Lincoln: University of Nebraska Press.

Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, *17*(2), 124.

Ekman, P., & Friesen, W. V. (1975). *Pictures of facial affect*. Consulting Psychologists Press.

Ekman, P., Friesen, W. V., & Hager, J. C. (2002). *Facial action coding system* (2nd ed.). Salt Lake City, UT: Research Nexus eBook.

Fantoni C, & Gerbino W (2014). Body actions change the appearance of facial expressions. *PLoS One*; 9(9):e108211

Fernández-Dols, J. M., & Crivelli, C. (2013). Emotion and expression: Naturalistic studies. *Emotion Review*, *5*(1), 24-29.

Fernández-Dols, J. M., & Ruiz-Belda, M. A. (1995). Are smiles a sign of happiness? Gold medal winners at the Olympic Games. *Journal of Personality and Social Psychology*, *69*(6), 1113 -1119.

Fridlund, A. J. (1991). Sociality of solitary smiling: Potentiation by an implicit audience. Journal of Personality and Social Psychology, 60, 229-240.

Fridlund, A. J. (1994). *Human facial expression: An evolutionary view*. Academic Press.

Gaspar, A., & Esteves, F. G. (2012). Preschooler's faces in spontaneous emotional contexts—how well do they match adult facial expression prototypes? *International Journal of Behavioral Development*, 3*6, 348-357.*

Gendron, M., Roberson, D., van der Vyver, J. M., & Barrett, L. F (2014). Perceptions of emotion from facial expressions are not culturally universal: Evidence from a remote culture. *Emotion, 14,* 251-262.

Hjortsjö, C. H. (1969). *Man's face and mimic language*. Lund, Sweden: Studentlitteratur.

Jack, R. E., Garrod, O. G., Yu, H., Caldara, R., & Schyns, P. G. (2012). Facial expressions of emotion are not culturally universal. *Proceedings of the National Academy of Sciences*, *109*(19), 7241-7244.

Kayyal, M.H., Widen, S.C., & Russell (2015). Context is more powerful than we think: Contextual cues override facial cues even on valence. *Emotion*. Advance online publication. http://dx.doi.org/10.1037/emo0000032.

Klineberg, O. (1938). Emotional expression in Chinese literature. *Journal of Abnormal and Social Psychology, 33*, 517-520.

Kraut, R. E., & Johnston, R. E. (1979). Social and emotional messages of smiling: An ethological approach. *Journal of Personality and Social Psychology*,*37*(9), 1539-1553.

Krumhuber, E. G., & Manstead, A. S. (2009). Can Duchenne smiles be feigned? New evidence on felt and false smiles. *Emotion*, *9*(6), 807.

Kunz, M., Prkachin, K., & Lautenbacher, S. (2009). The smile of pain. *Pain*, *145*(3), 273-275.

LeDoux, J. E. (2012). Rethinking the emotional brain. *Neuron, 73*, 653-676.

LeDoux, J. E. (2014). Afterword: Emotion construction in the brain. In L. F. Barrett & J. A. Russell (Eds.), *The psychological construction of emotion*. Pp. 459 -463. New York: Guilford.

Lindquist, K. A., Wager, T. D., Kober, H., Bliss-Moreau, E., & Barrett, L. F. (2012). The brain locus of emotion: A meta-analytic review. *Behavioral and Brain Sciences, 35*, 121-143.

Nelson, N. L., & Russell, J. A. (2013). Universality revisited. *Emotion Review*,*5*(1), 8-15.

Nelson, N. L., & Russell, J. A. (2014). A facial expression of pax: Assessing children's "recognition" of emotion from faces. Ms submitted.

Ortony, A., & Turner, T. J. (1990). What's basic about basic emotions? *Psychological Review*, *97*(3), 315.

Reisenzein, R. (2000). Exploring the strength of association between the components of emotion syndromes: The case of surprise. *Cognition & Emotion*, *14*(1), 1-38.

Reisenzein, R., Studtmann, M., & Horstmann, G. (2013). Coherence between emotion and facial expression: Evidence from laboratory experiments. *Emotion Review*, *5*(1), 16-23.

Rendall, D., Owren, M. J., & Ryan, M. J. (2009). What do animal signals mean? *Animal Behaviour*, *78*(2), 233-240.

Rosenberg, E. L., & Ekman, P. (1994). Coherence between expressive and experiential systems in emotion. *Cognition & Emotion*, *8*(3), 201-229.

Ruiz-Belda, M. A., Fernández-Dols, J. M., Carrera, P., & Barchard, K. (2003). Spontaneous facial expressions of happy bowlers and soccer fans. *Cognition & Emotion*, *17*(2), 315-326.

Russell, J. A. (1991). Culture and the categorization of emotion. *Psychological Bulletin, 110,* 426-450.

Russell, J. A. (1994). Is there universal recognition of emotion from facial expressions? A review of the cross-cultural studies. *Psychological Bulletin*, *115*(1), 102.

Russell, J. A. (1995). Facial expressions of emotion: What lies beyond minimal universality? *Psychological Bulletin*, *118*(3), 379-391.

Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review*, *110*(1), 145.

Scherer, K. R. (1992). What does facial expression express? In K. Strongman (Eds.), International Review of Studies on Emotion. Vol. 2 (pp. 139-165). Chichester: Wiley.

Schneider, K., & Josephs, I. (1991). The expressive and communicative functions of preschool children's smiles in an achievement-situation. *Journal of Nonverbal Behavior*, *15*(3), 185-198.

Susskind, J. M., Lee, D. H., Cusi, A., Feiman, R., Grabski, W., & Anderson, A. K. (2008). Expressing fear enhances sensory acquisition. *Nature neuroscience*,*11*(7), 843-850.

Tomkins, S. S. (1962-1963). *Affect, imagery, consciousness*. (Volumes 1 and 2). New York: Springer.

Trauffer, N. M., Widen, S. C., & Russell, J. A. (2013). Education and the attribution of emotion to facial expressions. *Psychological Topics, 22*, 237-248.

Widen, S. C. & Russell, J. A. (2008). Young children's understanding of other's emotions. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of emotions* (pp. 348-363). New York, NY: Guilford.

Wierzbicka, A. (1999). *Emotions across languages and cultures: Diversity and universals*. Cambridge University Press.

Debate: Keltner and Cordaro vs. Fridlund vs. Russell

The Debaters

Dacher Keltner is a full professor at UC Berkeley and director of the Berkeley Social Interaction Lab (http://socrates.berkeley.edu/~keltner/) and faculty director of the Greater Good Science Center (http://greatergood.berkeley.edu). Dacher's research focuses on the biological and evolutionary origins of compassion, awe, love, and beauty, emotional expression, and power, social class, and inequality. Dacher is the co-author of two textbooks, as well as the best-selling *Born to Be Good: The Science of a Meaningful Life* , and *The Compassionate Instinct*. Dacher has published over 190 scientific articles, he has written for the *New York Times Magazine, The Wall Street Journal, The London Times,* and *Utne Reader*, and has received numerous national prizes and grants for his research. He served as a consultant for Pixar's *Inside Out*, and WIRED magazine recently rated Dacher's podcasts from his course Emotion as one of the five best educational downloads, and the *Utne Reader* selected Dacher for one of its 50 2008 visionaries.

Daniel T. Cordaro received his Ph.D. from the University of California, Berkeley where he directed the Universal Expression Project – a program that aimed to decode the universal language of human expression across eleven cultures. The Universal Expression Project found evidence in both industrialized and remote cultures for not only universal patterns in emotional expression, but also some fascinating cultural variations and individual differences. Daniel is currently a postdoctoral research associate at the Yale Center for Emotional Intelligence, where he is exploring new lines of research on contentment and creating interventions for adults and children on cultivating emotional wellbeing in everyday life. He is also developing a new test of emotional intelligence to assess five skills: recognizing, understanding, labeling, expressing, and regulating emotions. This work aims to investigate new ways of assessing emotional skills and measure how emotional intelligence plays a role in human wellbeing.

James A. Russell is professor of psychology at Boston College. He has published over one hundred scientific papers, all on some aspect of emotion. His current work focuses on an approach to emotion called psychological construction, especially on ways to integrate this approach with other research programs such as appraisal theory and social construction. James was Editor-in-chief of Emotion Review from 2007 – 2014. He has co-edited *The Psychological Construction of Emotion* (2014) with Lisa Feldman Barrett, and The Psychology of Facial Expression with Jose Fernandez-Dols.

Alan Fridlund is Associate Professor in the Department of Psychological and Brain Sciences, University of California, Santa Barbara, and a member of its faculty in Developmental and Evolutionary Psychology. His work has concerned the history of psychology, emotion and nonverbal behavior, human evolution and Darwiniana, and morality and punishment. He co-authored three editions of *Gleitman's Psychology* (Norton), authored *Human Facial Expression: An Evolutionary View* (Academic Press, 1994), and has written an assortment of more focused papers. Though trained fundamentally in animal behavior and physiological

psychology, he has maintained an active clinical psychology practice for 30 years, focusing on people with serious mental disorders and co-morbid medical illness.

The Great Expressions Debate

August 2015 – Andrea Scarantino (AS): Thank you very much for your highly informative manifesto papers, which provide an up-to-date overview of three influential traditions in the study of facial expressions: Basic Emotion Theory, the Behavioral Ecology View and Psychological Constructionism. And thank you for agreeing to participate in this Q&A, in the course of which we will explore some of the central issues raised in the three pieces, hopefully unveil new areas of agreement and get clear on the nature and scope of the remaining disagreements. I begin with two clarificatory questions for each manifesto piece, and then formulate three open questions for all debaters.

Let me start from Keltner and Cordaro's manifesto piece. Dacher and Daniel, a significant novelty in your piece is the rejection of BET's standard assumption that emotional expressions must be momentary and facial. On the contrary, you argue that Darwin himself was clear that emotional expressions are extended in time (they convey information about what emotion one is undergoing as they dynamically unfold) and multimodal (they do not just involve the face, but also the voice and the body).

Is this proposal meant to replace Ekman's suggestion that for each basic emotion family there is a "facial theme" (with some variations) that is distinctive of it? For example, Ekman told us that "in all members of the anger family the brows are lowered and drawn together, the upper eyelid is raised and the muscle in the lips is tightened". Is your suggestion that there is no facial configuration distinctive of the anger, fear, disgust, surprise, happiness, and sadness families, as there is no facial configuration distinctive of embarrassment?

Keltner and Cordaro (K-C): In many ways BET was founded on the early discoveries of Ekman, Izard, and others focusing on facial muscle movements, discoveries that were enabled by specific methodologies of the times, most notably anatomically based facial action coding and still photography and video analysis. But since those discoveries, the study of emotional signaling, as we review, has advanced considerably, and it now considers multiple modalities – face, gaze, voice, head movements, bodily movements, tactile contact — and the dynamic unfolding of expressions. This has allowed several emotions neglected in the early phases of expression science back to center stage. In light o this robust new evidence, what facets of BET are in need of revision?

First, we think it is clear that there are emotions that do not have distinct facial expressions. This in itself represents an important departure from the strictest early formulations of BET, which focused intensively upon facial muscle movement as a defining criterion of emotion, but aligns with later versions, for example that offered by Ekman in 1992, that emotions must have distinctive signals, which include other modalities than the face, including vocalizations.

For example, awe has a clear vocal pattern, readily recognized in emotion recognition studies of participants from different parts of the world (Cordaro et al., in press), but we think, in light of select studies, that its facial display of inner eyebrows pulled up and in and gaze directed upward will not prove to be a reliable signal on its own. Or take the case of gratitude. Gratitude is featured in different classifications of emotion, and has many of the subjective qualities attributed to more well studied emotions – it is brief, of quick onset, and triggered by clear antecedents, namely the sense that one has received a gift from another person or people. And while little at this stage is known about its

physiology, gratitude does have a signal, one with clear antecedents in the behaviors of others species, but it is not in the face.

Specifically, as we review in our essay, humans can communicate gratitude with brief patterns of tactile contact that resemble in form, context, and function the grooming behavior of nonhuman primates. Importantly, still other studies find that gratitude cannot be communicated with any distinct facial expression, nor with any vocal display (e.g., Simon-Thomas et al., 2009). This kind of evidence suggests that facial expression is not the *sine qua non* of emotion, and is a significant reason why our reformulated BET focuses on multimodal, dynamic displays of emotion.

There are other emotions that do involve patterns of facial muscle movements, but that require other expressive behaviors — bodily movements, gaze activity, head movements – to signal the distinct emotion. This is most clearly true of the following emotions: pride – which involves a smile but requires head movements back and postural expansion to signal the state; embarrassment, which involves a controlled smile but requires head movements down and gaze aversion to signal the state; and love, which also involves a smile, but requires extended eye contact, head tilts sideways, and open handed gestures to signal the state (Gonzaga et al., 2001; Keltner, 1995; Tracy & Robins, 2004).

Here again we depart importantly from earlier formulations of BET, in particular that of Ekman, which did not consider these states to be emotions. Yet in following the methodologies laid out in these early formulations of BET, researchers are finding it to be increasingly clear that these three states – pride, embarrassment, and love, as well as others – meet the criteria laid out in BET to be considered distinct emotions. Had the field only focused on facial muscle movements, we would have learned little about the displays of these three emotions. By looking to other expressive modalities, signals have been uncovered, and emotion taxonomies have evolved.

This, then, represents an important expansion upon BET – there are proving to be a significant number of emotions – embarrassment, love, pride, awe, gratitude for example – that do <u>not</u> have distinct facial expressions, but that share other features of more well studied emotions. Past conceptualizations have treated these states as more extended affective phenomena that are not basic emotions – (love is a “plot”; see Ekman, 1992), or they have not considered these states (pride), or they have been agnostic as to whether these states will eventually demonstrate the emotion-like characteristics (e.g., awe; Ekman, 1992). As the evidence guided by BET mounts, we believe these states will meet the criteria for being considered emotions, as will other states (for full set of possibilities, see Keltner & Lerner, 2010).

Given the preceding arguments, can one infer that there are no distinct facial muscle movements, as postulated by BET, that covary with emotions like anger, fear, or disgust? The answer is a qualified no. There are reviews showing that self-reports of experiences of emotions like anger and fear do correlate with the predicted facial muscle movements from BET (Matsumoto et al., 2008). But, the critique of Russell in this debate and elsewhere points to necessary modifications. First, the relationship between experience and muscle movement is weak: correlations between emotion-specific muscle movements – what Ekman has called “reliable” muscles – and self-reports of the experience of emotion tend to range from .25 to .40. Second, the prototypical patterns are less frequent than assumed, although we hasten to note that the kinds of situations studied in the lab do not resemble the prototypical elicitors of emotions, in particular when it comes to emotions like fear or anger.

This leads us to conclude that the emotions of intense focus early in BET – anger, disgust, fear, happiness, sadness, and surprise – do have distinct facial muscle movements, but the patterns of those movements vary according to the individual and context, and they are only weakly associated with the experience of emotion. We think the variability in these expressions represents a fascinating area of unexplored variance in the field, and is likely to be illuminated by studying the influence of temperament, culture, and context upon facial expression. We think the weak associations between facial muscle movement and experience not only point to methodological problems – e.g., retrospective reports of emotion that are increasingly biased as the time between emotion eliciting stimulus and report increases – but necessary conceptual modifications of BET, most notably a systematic focus on context and intention in crafting the nature of the expression, as long suggested by Fridlund.

AS: Thanks Dacher and Daniel, let me briefly follow up. I was struck by the fact that in your answer you never once used the term *basic*, and included emotions like *love* that were explicitly excluded from the set of basic emotions by Ekman, and handed out to a theory of emotional plots. Is your view at this point that the qualifier basic has lost its function, in that all emotions are basic on your expanded notion? Or do you still acknowledge the existence of non-basic emotions, and if so how are they related, if at all, to basic emotions?

K-C: Early formulations of BET reserved the term "basic" for a limited set of emotions, those that are sufficiently distinct in different response systems from other emotions, and that can be understood as serving specific functions within an evolutionary account of emotion. The use of this term was useful for the times – the 1980s and 1990s — in making the strong case that emotions are distinct, in particular with respect to physiological patterning, and in beginning to make the argument that emotions can be thought of as adaptations, shaped by our evolution, a claim that has been significantly elaborated upon since early formulations of BET.

Nearly 25 years later, we think that the use of the term "basic" poses more problems than the benefits it introduces. In the most general sense, we believe all emotions have distinct profiles and serve some evolutionary function; so the term "basic" to refer to some emotions but not others is unnecessary. Just as critically, the term "basic" separates emotions into those that are "basic" and those that are "not basic." It is not clear at all what a non-basic emotion might be. Less evolved? Less distinct? Less physiological? Less clearly observed in other species? It's even harder to imagine what kind of data would sort different affective states into the categories of "basic" emotion and "non basic" emotion, or who, ultimately, would make the designation. For these and other reasons, we do not think it is productive to refer to some emotions as basic, and instead prefer terms like "well studied."

We additionally note that some of the concepts used to refer to emotions not meeting the basic emotion criteria in past iterations of BET, such as "emotion plot" to describe love, are also problematic, and do not fare well when stacked up against empirical data. For example, recent studies find that brief experiences of love have distinct patterns of signaling behavior, specific antecedents, and even specific physiological correlates – oxytocin release — suggesting that love, like emotions such as anger or fear, meets central criteria in the BET tradition (Gonzaga et al., 2001, 2006).

Ultimately, researchers guided by BET are interested in how emotions differ from one another, and how those distinct emotions shape our inner and outer worlds. They vary in their commitments to evolutionary approaches, and focus on different response systems, but are united by the question of figuring out the forms and functions of different emotions Since early formulations of BET and its focus on a limited set of emotions, the purview of BET has expanded dramatically, focusing on a wide array of states (for summary, see Keltner & Lerner, 2010).

There are active areas of research on at least 10 negative emotions: Anger, contempt, disgust, envy, fear, guilt, jealousy, sadness, and shame. And there are growing empirical traditions in studies of 11 positive emotions: contentment, enthusiasm, desire, love, compassion, gratitude, pride, awe, interest, amusement, and relief. As the empirical traditions focusing on these different emotions have matured, problems with early formulations of BET have arisen, as we detail here, in large part because theoretical claims that apply to 20 states (rather than 6 or 7 as was originally the case), necessarily encounter contradictions and qualifications. Generative theorizing has arisen that concerns itself with specific emotions (pride), or clusters of emotions (attachment related emotions such as love, desire, sympathy). This more local theorizing may represent the wave of the future of BET.

AS: A second clarificatory question concerns the role of context in your theory. A central theme emerging from Russell and Fridlund's manifesto pieces is that context plays a key role in determining which emotions are perceived on the basis of faces, since the same face is interpreted in a variety of different ways depending on the context. What role does the context play in your multimodal proposal? For example, do you expect that context will trump the face+posture+voice combo the way it seems to trump the face alone, and if so what is the point of studying face+posture+voice combos in isolation from the context?

K-C: We believe that the ability to recognize an emotion from patterns of nonverbal behavior is only enhanced when multiple modalities of communication are involved. Select studies lend credence to this claim, but more evidence is

warranted. When we see the full bodied, multi modal response of fear, or embarrassment, for example, recognition rises.

In our own empirical work, we also align with Fridlund's BECV, in that we think that the signaling of intentions is critical to the occurrence of the emotion-specific expression. For example, in recent work we have shown that: a) displays of embarrassment signal the commitment to social norms to observers, so critical to the appeasement function of that display; b) displays of love signal a long term commitment to a romantic partner (Gonzaga et al., 2006). But we would suggest that signaling intentions and the underlying experience of an emotion tend to be correlated in the occurrences of specific emotions, that these two components of emotion are not independent, but most typically correlated.

What role does context play in our revised BET? Most importantly, we believe that the relational context between signaler and perceiver—something first raised by Fridlund in his earlier work — leads to variation in the expression of emotion, and the inferences drawn by perceivers in judging the expression. For example, it is known that expressions of embarrassment signal more submissive social status. We would expect an embarrassment display to not signal such submissiveness when displayed by a high status individual. This sort of relational context variation in the meaning of emotional expressions needs to be systematically modeled, and is certain to reveal that the nature of the signal produced and the inferences drawn from that signal vary as a function of features of the relational context – power dynamics, degree of acquaintance, adversarial versus cooperative intentions, etc.

How much will the meaning of multi-modal patterns of expression vary as a function of context? The easy answer is that this is an empirical question. A safe bet is that context effects, which we grant are powerful, will be attenuated when multimodal signals are judged, given that they are likely to prove to be more reliable signals of emotion even in isolation from context.

AS: Let me move on to a couple of clarificatory questions on Fridlund's manifesto piece. Alan, in your manifesto piece you reiterate the central proposal of the Behavioral Ecology View, namely that the face does not automatically express emotions but rather conveys social intentions, because automatically expressing emotions would contradict basic principles of animal communication.

But why do we have to pick and choose? Since on a variety of theories of emotions, including BET, emotions involve states of action readiness, wouldn't a face that expresses emotion *ipso facto* convey a social intention? For example, it is true, as you point out, that a smile can sincerely convey readiness to affiliate without the agent being happy, but if a face conveys that the agent is happy, why would it not also convey that the agent is ready to affiliate?

Alan Fridlund (AF): It's worth noting, historically, that the term "emotion" was used to set off those behaviors that that we couldn't help, that "overcame us" or "got the best of us" – our passions (see Plamper, 2012, for the evolution of the term). "Emotion" was set against "motivation," and motivated behavior was instrumental, feedback-guided, goal-oriented, strategic. "Emotion" was what was *un*intended.

Theories of emotion have metastasized, and the concept of "emotion" has now become so malleable that it can be injection-molded to inhabit any theory, even mine (see discussion by Fridlund, 1994). Thus, if emotions "involve states of action readiness," then "emotion" can stretch even further to "include behavioral intentions." Be my guest. Of course, all this wordplay hinges not only on what is meant by "emotion," but also by "involve" (do you mean cause?), and by the ever-oxymoronic "state of action readiness" (is a state of readiness-to-act also a state of readiness *not*-to-act, and isn't this true of all states, and a truism about readiness itself?). We have come so far and yet not moved at all.

BET formerly espoused the early "passion" view of emotion; the Facial Affect Program fired off patterns to the face keyed to our emotions, and those patterns might *once* have been indicants of our reflexive predispositions (that's Darwin's Principle of Serviceable Associated Habits, which Ekman, 1972, endorsed in his Neurocultural Model), but they are now vestigial, and we need cultural display rules to mitigate them.

This view changed when Ekman began embracing the Tooby-Cosmides "solving life tasks" emotion model in the

1990's (cf., Ekman, 1992). At this point, emotions were no longer vestigial reflexes; they were organized, strategic motivations that arose in our Pleistocene "Environment of Evolutionary Adaptedness" (from J. Bowlby; see Tooby & Cosmides, 1990), and may or may not be suited to events in the contemporary world.

You ask if a face "conveys that the agent is happy, why would it not also convey that the agent is ready to affiliate"? I don't accept that faces "convey happiness," because I do not know a method of confirming scientifically the presence *and* the absence of happiness to allow this determination (and operationally, we need both). Nor do I believe that the face "conveys the readiness to affiliate" as a TV station conveys a storm warning or a car ad. Rather, a certain display, such as a smile, might probabilistically promote affiliation in a certain social context. By virtue of that evidence, the display may be labeled an "affiliative display," not necessarily due to anything intrinsic to its neurology or its morphology, but due to its function as observed in social interaction.

AS: Alan, your theory of facial displays has been very successful in sensitizing the emotion community to the fact that facial displays communicate about social motives in an audience-dependent fashion, a view that, as Keltner and Cordaro's manifesto paper shows, is now making its way also into BET. But I wanted to ask you for more clarification as to why it is evolutionary advantageous to convey one's social motives.

In a paper on animal communication that you often cite as a source of inspiration for your own views on facial displays, Dawkins and Krebs have stated the following: "It is information about what the actor will do next that poses theoretical problems…First, there is nothing to prevent animals 'lying' about what they will do next…and secondly, for an animal to declare its intention early on in a contest is equivalent to a card player showing his hand to an opponent at the start of the game. It is hard to imagine how selection could favour such behavior; instead, one would expect animals to conceal their eventual intentions until the last possible moment".

My question is: if it is not to the evolutionary advantage of senders to broadcast information about their own emotions, why is it to their advantage to broadcast information about their own intentions? Also, is your skepticism about the viability of scientific definitions of emotions the primary reason why the Behavioral Ecology View does not allow emotions to figure in explanations of the origin and current function of facial displays?

AF: BECV does not hold that faces signal irrevocable intentions, just the possible next steps in on-going negotiation. Thus, a "threat face" would not signal that I'm going to attack no matter what – in that case, a sneak attack would be best – but that I may attack if you do not alter your behavior.

More generally, BECV argues that, depending upon the context, signaling one's likely intentions can be an economical and safer alternative to enacting them immediately, with receivers countersignaling their own likely intentions based on their assessment of those signals. Both the signals and their assessments form the dynamic interchange by which interactants negotiate and determine their social trajectory (also see my manifesto).

As to emotion, making causal something that is ineffable is a fool's errand. But that's not the reason that "emotion" doesn't figure in BECV; it's that BECV's functionalist view of displays neither needs nor benefits from "emotion" as an explanatory construct.

For BECV, the claim, "it's not to the evolutionary advantage of senders to broadcast information about their own emotions," is not only unverifiable but nonsensical ("information" is broadcast about emotions?). Something akin to that claim lies within BET, which maintains that display rules had to evolve culturally to mitigate inherited expressions, either because those expressions were vestigial reflexes (Darwin, 1872, and Ekman, pre-1992) or motivated acts best suited to an earlier era (Tooby & Cosmides, 1990; Ekman, 1992, and thereafter).

With regard to the ontology of emotion itself, I am sympathetic with Russell's constructionist approach (he has summarized it tidily in this debate), largely because of its humility. I see it as a springboard to anthropological investigations as to how diverse peoples may or may not "package" their behavior and experience into entities that may, or may

not, resemble our Western emotions.

The cross-cultural studies on color and form (Gestalt) perception offer templates for understanding our tendencies toward packaging behavior into things like “emotions” as Kantian categories or Gibsonian affordances.

AS: Let me move on to a couple of clarificatory questions on Russell’s manifesto piece. Jim, in your piece you point out that happy people do not always smile, and that smiles occur without happiness. This is compatible with smiles having multiple causes: sometimes happiness, sometimes things other than happiness (you present several alternatives you think should have their day in court). But you also suggest that we “have no convincing evidence that emotions cause facial movements”.

This seems to imply that when people smile, we have no good reason to presuppose that happiness is *ever* (as opposed to always) the cause of their smiles. Is that your view, and if so what grounds your skepticism about the claim that happiness sometimes causes smiling? More generally, what sort of evidence would convince you that emotions sometimes cause facial movements?

Jim Russell (JR): At the heart of BET was a simple idea: feeling happy makes you smile, feeling fear makes you gasp, feeling disgusted makes you wrinkle your nose, and so on. Ekman (1980, p. 7) wrote, “When someone feels an emotion and is not trying to disguise it, his or her face appears the same no matter who that person is or where he or she comes from.” Ekman allowed that there are other causes of any facial expression (such as a display rule requiring a smile when greeting a stranger or when having your photograph taken). All the same, he implied that feeling happy, unless disguised, is sufficient for smiling. Ekman’s claim has not stood up well to the evidence.

The claim is difficult to test for various reasons, one of which is that emotion is typically confounded with other possible causes of the facial behavior. So, the scientific question is whether the emotion can be shown to cause the predicted facial expression when disentangled from other possible causes.

Consider the research program of Jose Miguel Fernandez Dols and his colleagues on happiness and smiling (e.g., Fernandez Dols & Ruiz-Belda, 1995; Ruiz-Belda, Fernández Dols, Carrera, & Barchard, 2003; Crivelli, Carrera, & Fernández-Dols, 2015; Fernández-Dols, Carrera, & Crivelli, 2011; for general review, see Fernandez Dols & Crivelli, 2013). In a series of field studies, they found instances of intense happiness (such as winning in sports or orgasm) that could be disentangled from other plausible sources of smiling and in which attempts at disguise were unlikely. Intensely happy people rarely smiled, except during a social exchange.

So, we have *no evidence* for BET’s hypothesis, that is, no evidence that feeling happy, unless disguised, is sufficient for smiling, that feeling happy automatically causes smiling. You asked what sort of evidence would be convincing for BET’s claim. Had these studies yielded results in the opposite direction, the case that happiness per se causes smiling would have been supported. The available evidence indicates instead that a more fruitful line of research would view smiling as a social tool. Research could then pursue questions about the uses of that tool. Research on other emotion-face associations found similar results (Reisenzein, Studtmann, & Horstmann, 2013).

Your final hypothesis (“emotions sometimes cause facial movements”) is substantially weaker than Ekman’s statement (which did not include the word “sometimes”), fails to specify when those times would be, and is insufficient to support BET’s evolutionary story that facial expressions, as automatic unbidden signals, are parts of pre-prepared solutions to recurring situations from the Era of Evolutionary Adaptedness. A hypothesis about “sometimes” can survive repeated failures to find supportive evidence, and “facial movement” moves away from BET’s specific predicted facial configurations as pre-interpreted signals.

A deeper problem with your hypothesis arises when “emotion” is defined, as it sometimes is, as a package that includes a facial expression as a part. Most affective scientists now agree that an episode of fear, for example, has multiple components. To illustrate, consider a case of fear that includes BET’s predicted facial expression: suppose that Sally undergoes an episode of fear one Saturday morning: she sees a bear, she appraises the bear as dangerous her heart races, she looks for an escape route, she subjectively feels afraid, and her face at some point resembles the

“fear face” (widened eyes and raised eyebrows) as BET has portrayed it. On the “package definition,” fear just *is* this whole package of components. What would we mean by saying that emotion, or fear, caused Sally’s facial expression? When we define “fear” as the full package of those components, one of which is the facial expression, we would mean that the whole causes its own parts.

On the “package” definition of fear, a more useful approach would be to ask if any of the non-facial components caused the facial component. This is the approach taken in a variety of competing theories. For example, in appraisal theory, specific appraisals produce specific facial movements (Ortony & Turner, 1990; Scherer, 1992; Scherer & Ellgring 2007). A similar approach is taken in psychological construction, which focuses on the components and seeks empirical evidence of relations among them.

Questions would be of this sort: Did her appraisal of danger cause Sally’s facial expression? Did her conscious experience, her feeling of fear, cause her facial expression? Did the massive increases in Sally’s sympathetic nervous system activity cause her facial expression? Did her visual scanning of the environment for an escape route cause her facial expression? All components will not be found in all (or even most) cases of fear, but the components recur, sometimes during fear but at other times as well. Each component can be studied separately for its relation to facial movement.

My guess is that the visual scanning of the environment is the most likely cause, and if so there is a ready functional explanation. On the other hand, one interpretation of Ekman’s (1980) statement quoted above is that the felt experience of fear causes the facial expression. Fernandez Dols and colleagues created a situation in the laboratory in which participants reported experiencing fear (while watching a clip from a horror film), but did not search for an escape route. These participants rarely showed the BET “fear face” (Fernandez Dols, Sanchez, Carrera, & Ruiz Belda, 1997). If evidence supports my alternative hypothesis about visual scanning, we would then have a precise account of the production of BET’s “fear face:” we would understand why it occurs sometimes during fear, sometimes fails to occur during fear, and sometimes occurs without fear.

An alternative to the “package” definition has been to think of “fear” as the cause of the components, with the emotion then presumably a specific pattern of brain activation. Of course, the brain causes the occurrence of each component, including any facial changes. But now the question is whether the same brain pattern causes all and only episodes commonly labeled “fear.” Is “fear” a useful scientific category for neuroscience?

For various reasons (heterogeneity, culture/language-specificity, historical shifts, fuzzy borders, and prototype structure), I argued that “emotion,” “fear,” and the like are not good scientific terms for psychology. For the same reasons, plus the fact that our linguistic ancestors knew next to nothing about what the brain does (Aristotle thought the brain‘s function was to cool the body), I doubt that these terms are good scientific terms for neuroscience. I also note that some neuroscientists are abandoning thinking of emotion-specific brain circuitry (LeDoux, 2015).

AS: Let me briefly follow-up. Your answer suggests that you mostly oppose what we may call a deterministic notion of causation, according to which effects mandatorily follow from their causes. Would you be open to probabilistic notions of causation, which are widely used in other areas of science? For example, when an epidemiologist says that smoke causes cancer, she does not mean that cancer follows smoking mandatorily, but only that the probability of cancer is raised by smoking.

Would you be willing to say that happiness is a probabilistic cause of smiling in the sense that it raises its probability? I suspect that many theorists who posit the existence of a causal relation between emotions and facial displays presuppose precisely this probabilistic notion of causation rather than the deterministic one.

JR: I am “willing to say” whatever the evidence requires. We can also speak of “probabilistic causation” if you like, although I know of no statement of BET in which the emotion–face link is labeled probabilistic causation. I view probabilistic causation as a way-station toward a scientific analysis, which would seek the mechanism involved. Early epidemiological studies found a correlation between smoking and certain cancers, but those studies did not answer the vital question of causality. Smoking might have been merely correlated with the actual cause, or early stages of

cancer might have caused tobacco craving. Laboratory studies with non-human animals showed that something about smoking was indeed causal.

Two follow-up questions were then essential: What about smoking causes cancer? And, under what conditions does smoking cause cancer? Further research isolated specific carcinogenic chemicals in smoke and certain genetic predispositions. Because tobacco smoke is chemically complex, because cancer is a family of diseases, and because the mechanisms are not yet understood, the full story is far from complete today. The phrase "smoking causes cancer" is more a warning to the public than a scientific analysis.

The claim that emotion is a "probabilistic cause" of facial movement confronts the problems described above when emotion was defined either as a package or as a brain pattern. But, let us set aside worries over definitions and also suppose that happiness and smiling (or fear and the "fear face") are correlated. The first question again would be whether something about emotion causes facial behavior. If evidence were affirmative, it would establish little other than it would be worthwhile to carry out closer, more rigorous experiments. The essential follow-up questions would then arise: what about happiness causes smiling, or fear the "fear face"? Under what conditions does happiness cause smiling or fear the fear face? That is, which components of the emotion are causal and in what contexts?

I think that my answer can be translated into your terms. If, as BET hypotheses, under conditions with no motive to disguise, happiness per se automatically results in smiling, or fear the "fear face," then the link would be deterministic causation. If happy people often smile, but sometimes not, and if scared people often show a "fear face," but sometimes not, then the link would be correlational. If further evidence established that something about emotion was causal, you could call it probabilistic causation, but we would need to search for what about the emotion is causal when it is and under what conditions. As in the fictional example above of Sally's fear, some answers would be compatible with psychological construction, some would not. I'm not sure what BET predicts exactly. Still, to repeat, I know of no evidence that when confounds are eliminated, emotion (however defined) is causal in any sense. If such evidence were to appear, then to me the follow-up questions would be of great interest.

AS: Jim, in your piece you emphasize the degree of variability characteristic of the facial expressions correlated with any discrete emotion. Basic emotion theorists try to explain variability by invoking display rules, blending between different emotions, the fact that a certain intensity threshold may have to be cleared before the relevant expression is manifested and the fact that basic emotions form families. Do you consider these sources of variability at all legitimate, or are they in your view simply ways to preserve the theory from falsification, as you suggest at least in the case of display rules?

JR: Perhaps the most surprising empirical finding in affective science is the amount of variability found within any particular emotion category. There is huge heterogeneity within the category, say, of fear or anger. The components of the emotion are less tightly joined, less correlated with each other, than anticipated. One instance of this general finding is what you term "variability characteristic of the facial expressions correlated with any discrete emotion" – by which you mean, I assume, that the predicted facial component is less correlated than anticipated with the various non-facial components of a given emotion.

Because BET assumed that, for a given emotion, the components are highly intercorrelated (since they all have the same cause, activation of the "affect program"), the theory faces a challenge in explaining the low correlations. You listed some attempted explanations. Display rules, blends, thresholds, and a family structure on their own are all sound hypotheses, but problems arise when these hypotheses are joined with BET.

Klineberg (1938) pointed out that societies have rules about faces (in my society: downcast eyes at funerals, smiles at parties), and I believe that people often follow these display rules. Ekman (1972) invoked those rules to explain how, given the same emotion, different facial expressions can be observed in different societies. However, when an emotion occurs without BET's predicted facial expression and a display rule is invoked as the explanation ad hoc, then BET's analysis becomes immune to evidence.

Consider, for example, the highly cited Japanese-American study on display rules. American and Japanese participants showed similar facial movements to a disgusting film during a private viewing, whereas they showed different facial movements to the film in a social situation. Ekman (1984) summarized: “In private, when no display rules to mask expression were operative, we saw the biologically based, evolved, universal facial expressions of emotion. In a social situation, we had shown how rules for the management of expression led to culturally different facial expressions.” No particular display rule had been specified ahead of time, and thus no prediction as to what facial behavior the rule required. No evidence was offered that Japanese are subject to a display rule and Americans not. No evidence for the operation of a display rule was offered other than the lack of BET’s predicted facial expression. No evidence was offered for the non-operation of a display rule when the predicted facial expression occurred during the private viewing, other than the occurrence of the expression.

A display rule was offered as the explanation of the observed cultural difference in the social situation, but alternative explanations, such as differences in emotion or in focus of attention, were not ruled out. (Incidentally, I followed Ekman in assuming that BET’s predicted facial expressions occurred during the private viewing, but it is not clear that this assumption is correct.) See Fridlund (1994) for a revealing analysis of this study and the display rule concept more generally.

The other hypotheses that you mentioned (blends, thresholds, and families) all use the concept of “emotion” to explain failures of BET’s prediction. As I said, the heterogeneity, culture/language-specificity, historical shifts, fuzzy boundaries, and prototype structure of the concept of “emotion” make it a poor tool for science. Adding blends, thresholds, and families complicates matters even further and potentially adds to BET’s immunity from evidence.

I know of no version of BET that includes a worked out account of blending or thresholds. If fear is blended with anger, what happens? Do eyebrows go up or down or cancel? Is the behavior attack or flight? Or attack while fleeing? What happens in the autonomic nervous system? (Levenson, Ekman, Heider, & Friesen, 1992, found finger temperature higher in fear but lower in anger. Again cancel?) What was the adaptive value of such a blend during the Era of Evolutionary Adaptedness?

The lack of predictive rules for blends increases the danger of making the hypothesis ad hoc (blending produces whatever is observed). Similarly, I know of no explicit hypothesis stating threshold values nor any means to measure the intensity of the entire emotional episode. Intensity of each component is potentially meaningful and measurable, but I know of no means of integrating intensity across components or whether the concept is meaningful. Are all components weighted equally? What is the intensity of an emotional episode with a frown, extreme sympathetic activation, but no vocal change and a denial of any felt emotion? Does it pass the threshold? What about the reverse: no frown, no sympathetic activation, but vocal changes and a claim of extreme emotion? (If BET considers these two cases as the same category of emotion at the same intensity, it would predict similar consequences. Psychological construction in contrast, considers the components different and therefore anticipates different consequences.)

That a category of emotion consists of a family of events is similarly a sound idea. Long ago, Beverly Fehr and I (1984) offered evidence that the concepts of emotion, anger, love, and so on are better understood from a prototype theory of categories than from the classical theory of necessary and sufficient features. I mean that the category has fuzzy boundaries and an internal structure in which some cases are better exemplars than others. Rather than sharing common features, exemplars within the category share a family resemblance. One implication of these findings is that category membership is less predictive than it would be if the category were classically structured. That category members form a family rather than a precisely defined set is a property of the category in the mind of the categorizer, not of the external world. After all, the categories of witches, superheroes, and goblins similarly show prototype structure. Family resemblance rather than common features makes emotion categories poor scientific tools and is therefore a challenge to BET.

Finally, let me return to the basic finding that initiated this question: the components within an emotion category are less intercorrelated than anticipated. Cases share a family resemblance rather than common features. This finding is a challenge for BET, but not for other conceptual frameworks. In psychological construction, for example, emotion is

replaced with its components, with no assumption that they stem from the same cause or are highly intercorrelated. Most of the components are neither emotional per se nor produced by emotion-specific processes. Certain components under certain circumstances might well cause facial movement. For instance, if a component of some instances of fear is visual scanning of the environment to locate an escape route, then visual scanning in those instances can cause eyes to widen and brows to rise. But then visual scanning, even without fear, would have the same effect. Fear, without visual scanning, would not.

AS: In this final stretch of the debate, I would like to ask three further questions to all debaters. The three manifesto pieces seem to suggest that all parties at this point agree that there is no one-to-one correspondence between facial displays and discrete emotions such as anger, fear, disgust, happiness, sadness and surprise, and that the snapshot method that relies on prototypical facial displays is fundamentally flawed. Is this indeed your view? If so, can this new area of agreement generate further convergence between research programs on facial displays, and if so how? Finally, what do you suggest as the best alternatives to the standard snapshot method using prototypical facial displays for the study of facial displays?

JR: Indeed, it is my view: There is no one-to-one correspondence between facial displays and discrete emotions, either for production or interpretation. And the snapshot method that relies on prototypical displays is fundamentally flawed for the purpose for which it has been used.

I anticipate further convergence. I applaud Keltner and Cordaro's emphasis on voice and body as they change over time as further sources of information that an onlooker uses and on their expanded list of inferences the onlooker might make. Their multimodal expansion converges with traditional accounts in the study of nonverbal communication, including my own. I hope we can continue the expansion on both the expresser's side and the onlooker's side.

I suggest that the expansion continue by including the expresser's physiognomy, current situation, the broader context in which the facial change takes place, and the interaction between expresser and onlooker. Indeed, there is likely no information about the expresser that an onlooker might not use. We can also expand the list of inferences the onlooker makes; the onlooker tries to infer the expresser's character, cognitive state, and likely behavior. Indeed, the onlooker can infer an uncountable number of things beyond characteristics of the expresser. (If I see the "expresser" squinting while facing West, I might guess the time of day.)

Because of the complexity and dynamic quality of this process, the information relied on by the onlooker is not well captured by a snapshot of the expresser at one slice in time. The process is an on-going rapidly changing interaction with a history and a future. In acknowledging this dynamic quality, Keltner and Cordaro move toward Fridlund's account, at least a little. In my lab, we have recently taken a step in line with Keltner and Cordaro's expansion by including face, voice, and body posture, all changing over time (Nelson & Russell, 2011 a,b,c;; 2012; 2013). We need to think of interpretation as a process rather than a labeling. New methods will have to contend with much more complexity and with the interactions involved.

As the processes of production and interpretation are empirically examined, the results will force theoretical convergence. I'm optimistic that researchers will converge on an account of facial behavior and its interpretation – just as convergence can be seen on other aspects of emotion. For example, consider the notion that the emotion *as felt* plays a causal role in certain facial movements. To examine this idea, we need an account of the felt emotion, and there is convergence recently. In my account, the emotion as felt (the subjective experience of feeling a specific emotion or what I called emotional meta-experience) is cognitively constructed.

I see no difference between my constructionist account and that offered by Levenson (2011), a prominent BET theorist. And the same basic account of the felt emotion was voiced by LeDoux (2015) from a neuroscience perspective: "I thus agree with basic emotions theorists that some responses that occur when people feel emotions are hard-wired, but I don't think that the emotion, the feeling, is hard wired. It is imputed, assembled, constructed, or otherwise cognitively created."

K-C: We think it is a stretch to say that the snapshot method is fundamentally flawed; rather, it was a first attempt in a

young science to understand how emotions are expressed, and it has generated enormously useful evidence and stimulated provocative debate, as evident in this exchange. The snapshot evidence – the matching of emotion terms to static, prototypical expressions – has produced two fairly entrenched camps in the field, one that presupposes that those static expressions do say something significant about emotional expression (us), and another that suggests that there is little meaning in those displays (Russell, Fridlund). Given this state of affairs, perhaps a way out of the stalemate is to turn to new empirical approaches. That was our hope in writing the manifesto piece.

Our review was founded on converging empirical discoveries over the past 15 years showing that the snapshot method only captures a small portion of the meaningful variance in a) how people express any particular emotion, and b) how people recognize emotion in other people. This is far from surprising: snapshots of facial muscle movements ignore other modalities of expression, and they represent a split millisecond in time, ignoring the dynamic properties of emotional expressions, now of increasing focus in the field. The critiques of Russell and colleagues point to other important sources of variation in need of theoretical modeling – contextual information, variation in the meaning of emotion concepts across individuals and cultures, and so on. So we agree that we should move beyond the classic snapshot, emotion recognition approach, but note that such approach, flawed as it may be, was pivotal in getting the science of emotion expressions off the ground.

With respect to new approaches and possible convergence, our version of BET has deep ethological foundations – the study of naturalistic behavior in real world contexts – and it bridges various gaps with alternative experimental approaches. First, and this comes straight out of our review and the ethological foundations of BET, we recommend looking at multi modal, dynamic expressions of emotion. A new generation of recognition studies is needed, which considers the signal value of multimodal, dynamic patterns of behavior, while taking to heart the critiques of forced choice methods and the need for free response data. We think this will begin to capture individual and cultural nuances in interpretations of emotional expression.

Second, we should study emotion in the contexts in which it is most likely to occur, which, as Fridlund has noted wisely, is in <u>social</u> contexts. Most of the canonical emotions that attract most of the scientific attention are social – anger, embarrassment, pride, love, sympathy, amusement, etc. We think that research will be well served by studying people in relationships in actual social interactions, rather than in sterile laboratory circumstances responding to static images and film clips. And in this vein, with all of the real world data now available through Youtube and other new social media, there are intriguing opportunities to study expressive behavior.

A quick search of videos can provide real-world evidence of what happens when people are in truly terrifying circumstances, or in real adversarial encounters with enemies, or engaged in genuine celebration. So we would suggest that the field move more closely to the more ecologically valid elicitors of emotion as a means to capture expressions of emotion. Such methods could be used to capture context-specific expressions, and what observers infer from such expressions. The recent work of Tracy and Matsumoto on shame and pride displays following losing and winning in the Olympics is illustrative of such an approach (Tracy & Matsumoto, 2008).

AF: This question stipulates the existence of “discrete emotions,” implies the existence of “prototypical facial displays,” and asks whether I assent to the proposition that the two are not linked. To me, this is like asking whether I indeed agree to no relation between phlogiston and dragons.

Let me open up the question so that it is not an epistemological trap: I do not believe that there are consensual scientific definitions of “emotion” that would allow us to know when a person is having and not having *an* emotion (and by Keltner and Cordaro’s account, “feeling” is now optional, which knocks self-report data off the table). Furthermore, we have no such definitions for the specific emotions referred to by the terms “happiness,” “sadness,” etc. Second, I do not believe that there are “prototypical facial displays,” and because we have no workable definitions of emotion, we cannot produce meaningful data about the relations between the two. To say that the “snapshot” method is flawed would be to suggest that the wider presumptions aren’t equally flawed.

AS: Let me briefly follow-up on your answer for further clarification. First, when you say that my question

“stipulates the existence of discrete emotions”, are you suggesting that you are not convinced that discrete emotions exist, in the sense that anger, fear, disgust and so on are fictions like dragons and phlogiston? Or are you simply questioning that anger, fear, disgust and so on are suitable categories for scientific investigation, on account of the difficulty of providing a consensual definition for them? Second, once we grant that the snapshot method is flawed both in its specifics and in its wider presumptions, the question of how to move forward remains open. So I will ask you again: What alternatives to the snapshot method do you consider most promising for the study of facial displays?

AF: As a philosopher, you know that asking me to declare whether “discrete emotions” such as “anger, fear, and disgust” actually “exist” is absolutely meaningless unless you define the terms before you ask. Specifically, one must say what is meant by “discrete emotions,” and then what it would mean for them to “exist.”

Let’s keep it simple. Discrete emotions such as anger, fear and disgust certainly exist *as concepts* for BET advocates, and probably for a good number of ISRE members. To be formally philosophical, I agree entirely with that claim and the sentence containing it. Can anything more be demonstrated scientifically? Perhaps on Twin Earth? That’s where so much of this debate has become mired.

For BECV, the essential question, thankfully, is not about whether “emotions exist,” but “How do our facial movements affect the trajectories of our social interactions?”. This question precludes snapshots, because our social interactions are diachronic, cumulative and interwoven. Specifying contexts (our interaction contexts are cumulative, and begin to comprise relationships), and capturing and understanding the different ways that people move their faces and how their interaction partners react, requires a dynamic, functional view, not one constrained *a priori* by BET’s freeze-framed boxes. Chovil’s (1991) inductive typology of communicative facial displays is one way to advance.

AS: My second question concerns the issue of universality. All parties seem to agree that the question of whether a certain emotion is or is not recognizable – an either-or distinction – from a facial display is not useful and that there are cross-cultural differences in the degree to which facial displays are recognized. But then debaters part ways on whether anger, fear, embarrassment, disgust, embarrassment, pride and so on are in any interesting sense universal.

Keltner and Cordaro seem to suggest that we will find universality at the level of multimodal and extended expressions rather than unimodal and momentary expressions, with the proviso that there will be gradients of recognition. Russell suggests that the better-than-random ability of recipients to match pictures with emotion labels does not establish any interesting form of universality. Fridlund doubts that recognition studies can help us settle the question of the roles of biology and culture in the production of facial displays, because species-constant learning can explain evidence of cross-cultural recognizability just as well as natural selection.

Could you state your final position on universality, describe its implications for the study of facial displays, and briefly summarize what you make of the views on universality expressed in the two manifesto papers other than yours?

K-C: Our final position on universality is that, as the methods and measures become more refined, and researchers move to more multimodal assessments of emotion, researchers will continue to document a substantial degree of universality. This work is inordinately hard to do, given how difficult it is to identify emotion-eliciting stimuli with similar meanings across cultures, the cultural variations in the meaning of words, and the reluctance of the field to study actual behavior. This being said, we expect different emotions, as postulated by BET, to have some core signal behavior, broad patterns of emotion-specific physiology and underlying appraisal, and similarities in the functional outcomes of different expressions (e.g., anger expressions deter observers of undesirable behavior).

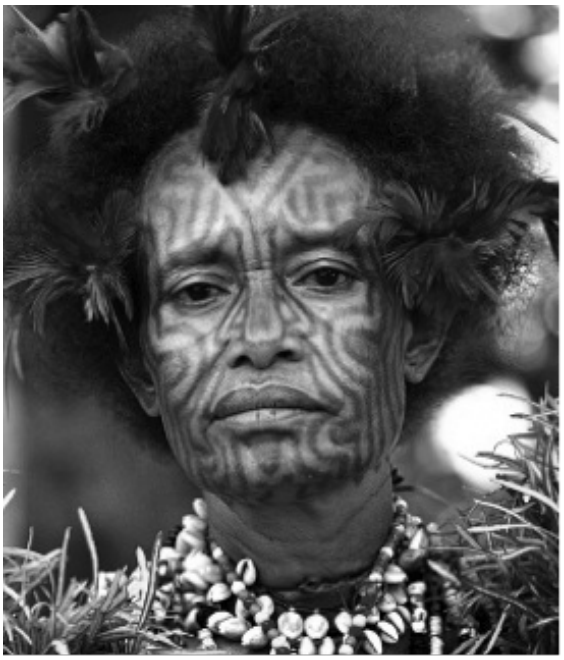
Ultimately, we agree with Fridlund, that it will be hard for expression-related data to fully tease apart the biological and species-constant learning explanations of universals in emotion recognition, all the more problematized by today’s technologies of smart phones, Facebook, and emoji. We believe the field will have to turn to other measures – genetic

markers, peripheral physiology, immune system response – to generate more unequivocal support for the thesis that emotions are evolved, genetically encoded biological processes that are observed in different cultures – the core of the universality thesis. We hope that our review points to several intriguing possibilities – the blush response, vagus nerve activation, the cytokine response – that await empirical study and that are open to falsifiable hypothesis testing.

AF: “Recognizability” stipulates what is only a BET presumption: that faces express universal emotions, with the only issue being the extent to which observers can divine them when they see them. The alternative, of course, is that faces move in all kinds of ways, and observers *ascribe* qualities to, and make inferences about, the faces they observe. If my wife comes in from outside and I ask her about the weather and she scowls, I see from her face that it’s lousy out. At that moment, in that context, her face *expresses what the weather is like*.

The varieties of information that others can ascribe to the face are nearly limitless. MIT mathematician Herman Chernoff used the individual features of cartoon faces as variables to represent arbitrary sets of multivariate data such as demographics and, yes, weather (Chernoff, 1973; Fridlund, 1994).

Chernoff was onto something. Here’s a photo of a Papua New Guinea woman I pulled off the Web:



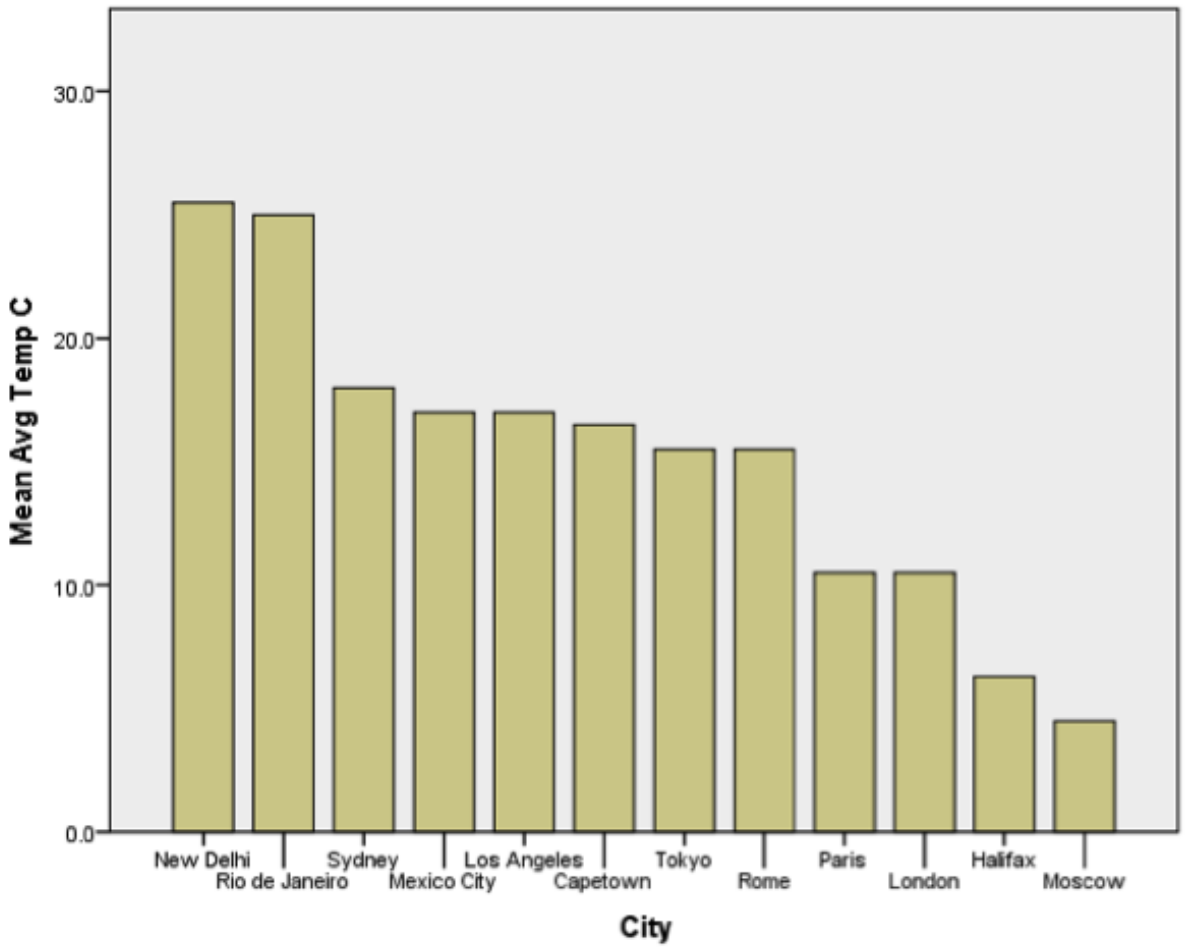
What is she “expressing” with her face? Let’s imagine the possibilities. Suppose I just asked her:

- What’s the food like in the tavern down the road?
- How constipated are you?
- What do you think of the village leader?
- Is your husband faithful?
- Do you like me taking your picture?
- Was your son sick for very long before he died?
- How’s the medical care in your village?
- Would you want to travel to Mars?
- Do you think it was the monkey meat or the melon?
- The woman down the road just told me she was gonna kick your ass.

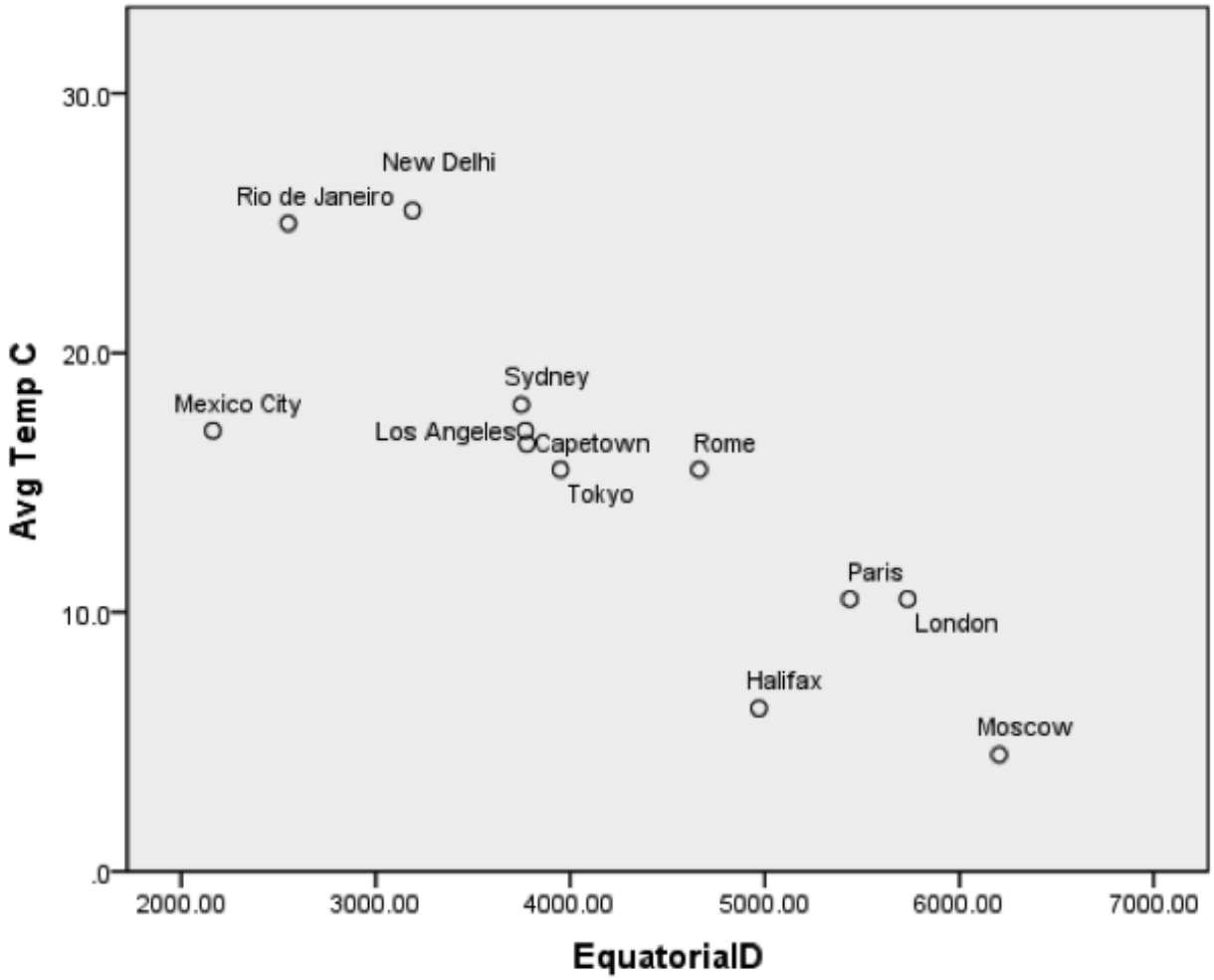
So her face can “carry” information about her colonic health, the status of her village’s medical care, and possibly her views on interplanetary travel. The face can “carry” information about nearly anything, really. In each case, “carry” only means *move within a context*, with observers making ascriptions to, and inferences about, the movements they observe within that context.

If facial “recognition” is presumptive, then Keltner and Cordaro’s “recognition gradient” is even more so, because they observed neither recognition nor a gradient. They merely obtained a random assortment of matching-to-sample scores, and arranged them from maximum to minimum. Mathematically, a gradient is a continuous function of Y on X, in the form of Y = f(X), and it requires two scalar variables. There is an inverse-square gradient of light by distance, for example.

Here is an analogy to what Keltner and Cordaro have shown. It’s a graph of annual temperatures (Celsius) for 12 of the world’s major cities, as plucked from a table on www.statcan.gc.ca. Before I graphed them in a bar chart, I sorted the cities from highest to lowest average annual temperatures. Can I claim that I have discovered a “temperature gradient” for major cities of the world? No, I can only claim to have found an assortment of cities that differ in temperatures, and that I know how to sort the temperatures from highest to lowest.



Getting a gradient requires two scalar variables. In this case, the abscissa needs to be scalar and not categorical; this mandates a regression plot instead of a bar graph. How might I proceed? I might have a hunch that distance from the Equator has something to do with the annual temperatures in the original table. Therefore, I found the equatorial distances in km (using dateandtime.info) for the 12 major cities and plotted them against the annual temperatures:



Now we have an actual gradient, of annual temperature as an (apparent) inverse function of equatorial distance, with each of the major cities marked on the regression plot. There are two outliers, which requires further explanation (air pollution?).

Had Keltner and Cordaro framed and tested an hypothesis, e.g., that the matching of certain facial or face + body configurations might be a function of Westernization or the use of an Indo-European language or some other parametric variable, they would have been able to claim a “gradient.”

Gradients of matching-to-sample scores for multimodal expressions, as Keltner and Cordaro propose, will require multivariate regression plots in *n*-space, where *n* is the number of variables that will constitute their expressions, and each variable of *n* is a time-series vector given that Keltner and Cordaro wish to measure dynamic expressions. Culture samples will need to be compared for similarities and differences using confirmatory factor analyses and discriminant analyses. These techniques are difficult enough for “snapshot” data; they are nearly intractable for the time-series data which must be obtained. I know these issues all too well since, long ago, when I was a BET acolyte, I was among the first to use these multivariate techniques for the “recognition of emotion” (Fridlund & Izard, 1983; Fridlund, Schwartz, & Fowler, 1984).

Onto universality. What question do we want answered by pursuing the “universality issue”? If it’s the biology vs. culture conundrum, such studies will always be indeterminate, for the simple reason that both uniformity and diversity are expected products of either cultural or natural selection. Uniformity can arise phylogenetically or via convergent evolution (convergent *cultural* evolution was misnamed “species-constant learning” by Gordon Allport, and the term persisted with Ekman), making nonhuman primate studies equally indeterminate. It is worth asking, however, whether certain features of our facial displays vary with certain genotypes, as a function of known human migratory patterns (e.g., they may correlate with hemoglobin group dispersion; e.g., Fridlund, 1994), or are dependent upon the phonemic

makeup or prosodic patterns of the speech they accompany across and within cultures.

I do not believe that Keltner and Cordaro have resolved the definitional issue with “emotion” but instead have complicated it. In their formative writings, and in the Neurocultural Model (Ekman, 1965, Ekman & Friesen, 1967, Ekman, 1972), Ekman and Friesen followed Tomkins in arguing that emotion was expressed strictly by the face, “while the body shows the adaptive efforts of the organism to cope with the affect state” (Ekman & Friesen, 1967, p. 718). Keltner and Cordaro now reverse that position by re-adding what Ekman and Friesen jettisoned, the very gestures and movements that foundational nonverbal communications researchers like Mead and Birdwhistell always considered important and modern ones still do (e.g., Bavelas & Chovil, 2000).

There are two problems with Keltner and Cordaro’s tack. The first is prosaic: adding variables – especially in the form of multivariate time series – complicates prediction and analysis, and leads to accumulation of error terms and the need for ever-larger sample sizes to achieve statistical power. The second is substantive.

Keltner and Cordaro want to add gestural and other bodily movements to their “expressions of emotion.” By what procedures will they determine which movements, committed by whom and when, are part of the emotional expressions themselves, and which movements, committed by whom and when, reflect cultural display rules to manage those emotions or even fake them? In the original Japanese-American cultural display rules study (reported in part by, e.g., Ekman, 1972; and see Fridlund, 1994, for detailed description, including its never-published “missing” condition), self-report data were used to verify the presence of “emotion”, but what would be criterial for emotion now without *qualia* as definitive?

Keltner and Cordaro, by making *qualia* optional in their “New BET” definition of emotion, would be counterfeiting the term while profiting from its cash value among non-BET researchers who haven’t yet been let in on the secret. New BET researchers could claim to be studying “emotion” while they are really studying “emotion*”, which is emotion-without-the-feeling. Thus, in a New BET study that concluded, “happier people smile more,” the study would have to be footnoted, “NOTE: In accordance with the provisions of New BET, people who are happy do not have to ‘feel’ happy (Keltner & Cordaro, 20xx).” This will delight readers, I am sure – although they need not feel it.

I find Russell’s Minimal Universality position, which he reviews in this debate, quite compatible with my own thinking, because it presumes little and builds from the bottom. We know too little to continue to force-fit huge, lumbering theories onto scant data.

JR: In the phrase “degree to which facial displays are recognized,” you seem to assume that faces display BET’s specified emotions, but that should be a hypothesis rather than an assumption. Also, “recognition” is a loaded term because it presupposes that the emotion is there to be recognized or not. That too should be a hypothesis rather than an assumption. That “better-than-random” performance fails to establish BET’s claim is a simple matter of appropriate statistical inference.

I urge continued studies of universality, although not continued use of the same old methods. Studies of universality are also studies of differences among societies, and we cannot understand human psychology without observations on similarities and differences among societies.

On the production of facial movements, we have insufficient evidence to go on, but I guess that faces universally move primarily (but not exclusively) as part of three processes: (a) paralanguage (i.e., facial movements have semantic, syntactic, and pragmatic functions during speech), (b) perceptual-cognitive processes (e.g., widening the eyes in visual search, moving the lips in tasting, and so on), and (c) social negotiation (i.e., the social exchanges discussed by Fridlund).

On the interpretation of facial movements, everyone agrees that observers derive information from another’s facial movements. I proposed a form of universality I called “minimal:” People everywhere use the expresser’s facial movements, in conjunction with whatever other information is available, to infer what they can about the expresser (Russell, 1995). So, for example, categorization of the state of the expresser might be a universal process, but the system of

categories used might vary somewhat with culture and language. People in modern Western cultures interpret one another by relying on, among other things, their system of categories that include “emotion,” “anger,” and so on, but people in cultures remote from the West do not have exactly the same categories.

I used the word “minimal” to characterize the small number of non-controversial assumptions needed to account for current evidence and to contrast with the maximal universality posited in BET: Ekman (1972, p. 279) wrote, “The evidence now proves the existence of universal facial expressions… Regardless of the language, of whether the culture is Western or Eastern, industrialized or preliterate, these facial expressions are labeled with the same emotion terms: happiness, sadness, anger, fear, disgust and surprise.”

On the other manifestos, I find Fridlund’s manifesto compelling, in its analysis of the nature-nurture issue, in its critique of emotion-based theories, and in its proposals for a new theory of facial expressions. I applaud Keltner and Cordaro for making their version of BET responsive to previous critiques. Their research will yield valuable information. Implicitly, they acknowledge a need to revise BET. I believe that a major challenge in doing so will be making the theory testable. I remain skeptical that BET can be revised to accommodate the evidence without abandoning its core tenets. Indeed, after this exchange, I wonder just what core tenets of BET remain. I hope to see empirical and theoretical pursuit of all three – and indeed alternative — conceptual frameworks.

AS: My final question concerns what is arguably the most intractable difference between debaters, namely the question of whether or not the field of affective science has managed to provide a productive scientific definition of emotion and its subordinate categories. Dacher and Daniel seem happy with a modified version of Ekman’s (1999) original definition, according to which basic emotions are solutions to fundamental life tasks with 11 characteristics, none of which is a *sine qua non* for a basic emotion to be instantiated (with the possible exception of distinctive universal signals, whose *sine qua non* status is presented by Ekman as a “challenge”).

The list includes distinctive universal signals, distinctive physiology, automatic appraisals tuned to distinctive universals in antecedent events, distinctive developmental appearance, presence in other primates, quick onset, brief duration, unbidden occurrence, distinctive thoughts, memories and images, and distinctive subjective experiences. Dacher and Daniel, could you explain why you think that this definition is promising, and if so how do you propose to improve on it in light of what has transpired from this debate? Jim and Alan, could you explain why you find this definition to be hopeless, and why you believe that no amount of tweaking can make it viable?

AF: In recent years, BET has presented a moving target. One major change was prompted by the Ortony and Turner (1990) attack on “basic emotions.” Ekman responded by introducing the term “emotion families” (Ekman, 1992), which widened BET’s criteria for expression of any given emotion.

Ekman altered his writing about emotion itself by around 1992 (Ekman, 1992), when he began citing Tooby and Cosmides’s (1990) “life task” view of emotion as adaptation. This motivated and strategic reformulation of basic emotion theory is fundamentally incompatible with the Neurocultural Model’s (Ekman, 1972) earlier view of emotional expressions as Darwinian, vestigial habits that had to be managed by cultural display rules. The ramifications of this switch for the theory’s tenets are unacknowledged among BET advocates, because whereas the earlier version mandated display rules to govern expressions that were stipulated to be vestigial, the newer “adaptationist” version allowed that the expressions might have evolved on their own as components of behavioral patterns that enhanced inclusive fitness, with no requirement for cultural display rules to squelch or counter them on the fly.

Yet another radical change was in response to findings of implicit sociality in solitary facial expressions (e.g., Fridlund, 1991). Ekman and Keltner (1997) dismissed the findings summarily. Ekman then revised BET to encompass the notion of *solitary* display rules (Ekman, 1997) to explain solitary expressions, although this concept vitiated the rationale and conclusions of BET’s only empirical claim to display rules, the original Japanese-American study, which rested on the proposition that solitary expressions had to be spontaneous and “emotional” (Ekman, 1972; and my manifesto).

Finally, in a vast leap from his original view that emotion was categorical and decodable only from the face, Ekman (1999) provided a list of 11 characteristics, of which (quoting the above) "none …is a *sine qua non* for a basic emotion to be instantiated." What are we to do with this? A laundry list of vague qualifiers such as "unbidden occurrence" (to whom?), "distinctive thoughts," and "brief duration" do not make for a scientific definition. What is of equal importance, but has been missing in every BET variant thus far, is the complementary set of exclusion criteria – a stipulation of those conditions under which emotion, or a particular emotion – is not occurring.

As I noted earlier, Keltner and Cordaro are now loosening the criteria even further by reclaiming within "emotional expressions" the bodily movements that the original Neurocultural Theory jettisoned, and it is reasonable to ask whether this sprawling theory, with its evasions, revisions, slipclauses, and patches, has any remaining coherence or explanatory value.

Historian of science Jan Plamper (2012) has surveyed the history of the BET enterprise, as critiqued in depth by Leys (2007, 2010), and declared that, "[f]rom the standpoint of the natural sciences and according to the principles of scientific procedure and verity, Ekman's research is bankrupt" (p. 158). Plamper's summary judgment applies to Ekman's neurocultural version. He could not anticipate Keltner and Cordaro's "new BET" effort to salvage BET by offloading some of its core tenets, which strikes me as trying to keep the BET ship aright by hacking away at its keel.

There is a larger perspective from which I disagree with BET. For me, BET is riddled with a preconception of emotions as hermetic "things" with inner circuits and outer manifestations (Leys, 2010), and these emotions in BET are intertwined with a Western, Augustinian conception of a "real self" versus a "managed self" (Cary, 2000; Fridlund & Duchaine, 1996). Combined with the fact that the questions and methods used to study expression within BET are so Procrustean (readers will note the relentless BET framing of the questions even in this debate), and the predictions possible within BET are now so imprecise and slippery, little of substance will likely be learned.

For my money, we need more anthropologists and historians to acquaint us with the various ways in which the peoples of the world make – and made — sense of their behavior in their terms. As for understanding how we signal each other and navigate our social terrain, BECV offers a clear-cut, alternative direction.

JR: The word "emotion" points to real and important events and dispositions, which we need to study and understand. Still, it does not follow that "emotion" defines a scientifically tractable domain. Similarly, the word "constellation" points to real stars in a real geometric configuration from the perspective of earth. "Constellation" was once a term used in astronomy, but was later abandoned as a scientific term because constellations do not explain events of interest to astronomers.

Andrea's final question raises the question whether "emotion" as defined by BET theorists is a scientifically tractable domain. Let me first ask, however, if Ekman's list of 11 characteristics really is a definition and, if so, what sort of definition it is. Let me distinguish two types of definition, each serving a fundamentally different purpose (Russell, 1991; Widen & Russell, 2011).

What I call a "descriptive definition" aims to capture a folk concept: What do ordinary people mean by the word "emotion"? This is a topic in the semantics of modern English: how to articulate the meaning of a non-scientific concept in everyday use. Much as an anthropologist might try to capture what folks in a certain society mean by words translated as "demon" or "chief" or "spirit," psychologists can try to define "emotion," "anger," and so on in a way that captures their everyday meaning.

Descriptive definitions of emotion terms are important because the concepts expressed play a role in the way folks think, remember, and judge propriety and morality. The everyday concepts of emotion have a role in law and are involved in communication between psychologists and the people being studied.

I doubt that Ekman meant to offer his list of 11 characteristics as a descriptive definition. I say this because, as an attempt to formulate a descriptive definition, the list strikes me as implausible. Each characteristic listed would have to have a psychological reality: ordinary people would have to understand and use each characteristic to decide what is

and what is not an emotion. But, the characteristics are themselves in need of definition, and ordinary folk do not have access to some of them: distinctive physiology, automaticity of appraisals, universality of signals, presence in primates, and so on.

Indeed, the characteristics do not help us decide whether a specific event is or is not an emotion. If I have a certain subjective feeling and wonder whether it's love or indigestion, how does "presence in primates" help me decide? Furthermore, to be a *successful* descriptive definition, the set of things to which the definition applies would have to overlap perfectly with the set of events named emotion in everyday thinking. But it is pretty clear that this is not the case. Consider brief duration. The set of events of brief duration leaves out love and hate, most cases of grief, anxiety, and depression, and some cases of happiness, sadness, fear, and anger. Note that this blocks Ekman's strategy of handing out some items that do not meet the definition of basic emotion to a theory of emotional plots or other affective constructs. All "blue ribbon" basic emotion types like anger and fear have tokens that do not satisfy the definition.

One possibility is to consider some of the characteristics on the list of 11 optional. The problem is if we make too many characteristics optional we end up capturing items that do not have anything to do with emotions, from angina to xenophobia. Angina lacks some of the characteristics but it includes others: distinctive physiology, quick onset, brief duration, unbidden occurrence, distinctive thoughts, memories and images, and distinctive subjective experiences. Xenophobia similarly lacks some characteristics but it includes others: automatic appraisals, quick onset, unbidden occurrence, distinctive thoughts, memories and images, and distinctive subjective experiences. Indeed, if all characteristics can be optional, as Ekman seems to suggest, it is hard to imagine a psychological event that is *not* included.

In any case, if interpreted as a descriptive definition, Ekman's list would compete with other accounts (Fehr & Russell, 1984; Johnson-Laird & Oatley, 1989; Ortony, Clore, & Collins, 1988; Wierzbicka, 1999). Which of these accounts best captures the folk concept of emotion in everyday use is an empirical issue, and we would have to see evidence about how regular language users use emotion concepts to settle the matter.

What I call a "prescriptive definition" aims to provide scientists with a useful concept for understanding some scientific phenomenon. Much as physicists have modified the concept of *force* from its primitive folk meaning to its current prescriptive definition in physics, so psychologists can begin with the folk concept of emotion and modify it until it becomes a scientific tool. Scientists can stipulate what they mean by a scientific term as they build a theory of the phenomena. If "emotion" is to become a scientific tool, we would need to develop a prescriptive definition for it.

I doubt that Ekman's list is meant as a definition in this prescriptive sense either. Prescriptive definitions used in science – e.g. the definition of probability as relative frequency, the definition of intelligence as ability to pass a Turing test – aim to increase precision and offer clear criteria of inclusion and exclusion. If Ekman's list really were a prescriptive definition, it would have to dictate more precisely which cases are and which are not basic emotions. With no "sine qua non" (necessary) characteristic and no exclusion criteria, the set of events to be tested and explained is massively indeterminate and heterogeneous. As a result, the basic goal in science of making concepts measurable is off to a poor start.

Incidentally, I have never seen a research project based on this definition – that is, a project in which a sample of human events was objectively assessed on the 11 characteristics and those that pass some threshold are then stipulated to be emotional events, with the rest regarded as non-emotional events. Nor has this list, to the best of my knowledge, served as a prescriptive definition in the development of theory.

Let me suggest instead that Ekman's list of 11 characteristics is a set of empirical claims. Research projects in BET implicitly rely on the folk concept of emotion (either through the experimenters' choices or ratings by participants or observers) and view the list of 11 characteristics as a set of empirically testable hypotheses about the events picked out by the folk concept "emotion".

Indeed, Ekman clearly treated each characteristic as an empirical finding. For example, the (alleged) fact that facial signals are universal was presented as a major empirical discovery. The discovery was that what we call anger in ordinary English is manifested in the face in the same way across cultures. If a facial signal were instead a non-optional

part of a prescriptive definition, like passing the Turing test is a non-optional part of a prescriptive definition of intelligence, then an event would *have* to show the predicted signal in order to be a basic emotion. It would not be a surprising discovery that basic emotion have distinctive signals, because something could not be a basic emotion if it did not have such signals.

So, my final query to basic emotion theorists writ large is whether they offer Ekman's list as a definition of "emotion," and, if so, whether the definition is descriptive or prescriptive. If it is descriptive, where's the evidence that is captures the folk concept of emotion better than competing accounts? If it is prescriptive, how can we deal with the indeterminacy and heterogeneity implied, and how can we make the concept more scientifically measurable? Is emotion to be thought of as the package of components or as the neural mechanism underlying the changes of components? If the list instead is a set of empirical claims, what definition of basic emotion does it presuppose?

But what is the alternative? My suggestion is to treat "emotion," "anger," "fear," and so on as the folk concepts they are and to continue to seek descriptive definitions for these terms. Independently, we can develop an alternative conceptual framework for all the events those terms (vaguely) point to. We would abandon the assumption that "emotion," "anger," and the rest pick out scientifically tractable domains and the assumption that "emotion" is an explanation.

Those events consist of components, and the components provide one (but not the only) starting point. This is precisely the insight at the foundation of psychological constructionism, which abandons the search for a prescriptive definition of emotion and the assumption that emotion is a scientifically tractable domain. What we need instead is to develop prescriptive definitions for each of the components of an emotional event, whether each occurs during an emotion or not.

This captures what experimentalists are already doing. Although an experiment might be dubbed a study of, say, fear, the experiment will in fact be generally a study of the components and only some of them. (For example, Levenson, Ekman, Heider, & Friesen's, 1992, famous study of emotion among the Minangkabau was phrased as a study of emotion but was in fact a study of two components: specific changes in facial behavior and specific changes in the autonomic nervous system.) LeDoux (2015) has recently articulated his reasons for re-framing his own theory and research not in terms of fear but in terms of certain neural pathways that are part of a survival system. He wrote: "I have to share some of the blame for being viewed as a basic emotions kind of researcher. In my work on Pavlovian fear conditioning, I have focused on how the brain detects and responds to learned threats. But I called the brain system that does this the fear system. This was a mistake."

K-C: The multiple criteria approach to defining emotion so central to BET is at its heart pragmatic, oriented toward empirical science. It helps researchers differentiate moods, which are longer, from emotions, which are briefer (although this claim has generated very little empirical attention). It gives researchers some solid, well-defined, measurable criteria for differentiating emotions from one another (e.g., how is embarrassment different from shame, or awe from surprise and fear). It allows researchers to identify emotions as they occur in the complex unfolding of social behavior. The peer-reviewed studies inspired by BET number in the thousands. It's naïve to assume that such a robust empirical tradition with so many field-shaping advances represents a failure.

More generally, theoretical claims should be judged by the scientific studies they inspire. And in this sense, the criteria posited by BET have proven to be enormously useful in three distinct ways. First, these criteria of BET have proven critical to the study of emotions ignored in early studies of emotional expression, paving the way for new discoveries, a hallmark of a useful scientific approach. Guided by BET's criteria, scientists have made significant progress in understanding emotions like embarrassment, pride, and shame, as well as sympathy, love and desire, and more recently awe, relief, and interest. Critical to these more focal endeavors is the notion to compare closely related states to one another to identify distinctions in their patterns, a framework laid out in BET.

Second, BET provides a set of guidelines for synthetic and systematic empirical review: if one wants to make the case that a state is an emotion, the criteria spell out what sort of data one must provide (e.g. data on distinctive signals, data on distinctive physiology, etc.), and these criteria have been used with clarity and success in such reviews (e.g.,

on embarrassment, see Keltner & Buswell, 1997; on compassion, see Goetz, Simon-Thomas, & Keltner, 2010; on pride, Tracy & Robins, 2004). What this has encouraged is a more synthetic approach to theorizing about emotion, one that grapples with the evolution of different emotions, their likely physiological underpinnings, and the specific behaviors emotions guide.

Finally, it is worth noting that BET laid a foundation for functional approaches to emotions, which posit that emotions serve more specific proximal functions within social interactions, and more distal functions within evolutionary or cultural frameworks. This more explicit theorizing about the functions of distinct emotions is an extension of the early claims in BET that emotions are adaptations to the fundamental life tasks humans have faced in our evolution, and has proven fruitful in guiding the field.

Before turning to what we think is in need of revision, we also note a critical emphasis in this multiple criteria approach to emotion: it moves the question of what emotions are and how we measure them beyond the reliance upon words, an emphasis that dominates many areas of inquiry (e.g., studies of self-reports of emotional experience, narrative studies, emotion recognition studies of static photos). It does so because subjective experience is just one of the criteria for the instantiation of an emotion, and a non-essential one. We believe the sole reliance upon self-report measures is problematic because a) reports of emotion are retrospective, b) those reports are filtered through a judgmental context, and c) emotion words are difficult to translate across cultures. The BET definition above prioritizes signaling behavior, and physiology, which are less subject to the aforementioned problems.

But important modifications are needed. First, systematic attention must be paid to contextual sources of variation in the production of emotional behavior and the meaning of that behavior to outside observers – a vibrant area of inquiry in new contextualist approaches to emotion recognition (Barrett, Mesquita, & Gendron, 2011). This line of work will have profound implications for the study of expressive behavior, revealing individual, cultural, and contextual sources of variation in signaling behavior and away from the idea that each and every instance of an emotion is signaled in the same behavior across individuals and contexts.

Second, we note that the BET criteria do not capture how emotions unfold, and this neglects the behaviors emotions motivate and the specific effects emotions have on different cognitive processes, such as attention, perception, memory, and judgment and decision making. This is a critical shortcoming, one we hope that will be remedied as researchers move to understand how emotions unfold dynamically, shaping patterns of relating to the environment over time.

Finally, it will be important for this approach to grapple with the idea that emotions cluster in families. In its evolution, BET has moved to the position that all of its criteria apply similarly to <u>all</u> emotions. This is an important stance, for it clearly defines what differentiates the emotions from one another, and enables the study of new emotions, as outlined above. But, ultimately, we think the story will be more complex, with some criteria applying more directly to certain emotions than others. We have already outlined how this is so in the realm of expression: some emotions are clearly signaled in the face, others not.

It is likely that other response systems may be common to clusters of emotion for important theoretical reasons. For example, empirical studies can differentiate prosocial emotions like love, sympathy, and gratitude in terms of appraisal patterns and thoughts and tactile and vocal expression, but they may all share a core peripheral physiological response – elevated vagus nerve activation, perhaps the release of oxytocin – but be differentiated in specific central nervous system patterns. A robust definition of emotion must illuminate not only distinctions between emotions but commonalities across conceptually similar emotions, and this is lacking in current formulations of BET. The promise of this work is a fuller understanding of how the myriad response systems now studied in the field of emotion map to the 20 o so states of interest to investigators.

AS: Thanks Dacher, Daniel, Alan and Jim for this terrific debate. For decades, research programs in the study of facial expressions have been at odds with another without directly engaging in a formal debate. You deserve great credit for having done so in this setting. It is my hope that this debate has made clearer than ever before what competing research programs in the study of facial expressions still disagree about, while also re-

vealing areas of substantive agreement. I encourage our many readers, who, I am sure, have been excited, incensed or otherwise provoked by various aspects of this debate, to chime in, using the "Leave a comment" tool below. Thanks again!

References

Barrett, L. F., Mesquita, B., & Gendron, M. (2011). Context in emotion perception. *Current Directions in Psychological Science*, *20*(5), 286-290.

Bavelas, J. B., & Chovil, N. (2000). Visible acts of meaning. An integrated message model of language use in face-to-face dialogue. *Journal of Language and Social Psychology, 19,* 163-194.

Cary, P. (2000). *Augustine's invention of the inner self*. Oxford: Oxford University Press.

Chernoff, H. (1973). Using faces to represent points in *k*-dimensional space graphically. *Journal of the American Statistical Association*, *68*, 361-368.

Chovil, N. (1991). Communicative functions of facial displays. *Journal of Nonverbal Behavior, 15,* 141-154.

Cordaro, D.T., Keltner, D., Tshering, S., Wangchuk, D., & Flynn, L. (in press). The voice conveys emotion in ten globalized cultures and one remote village in Bhutan. *Emotion*.

Crivelli, C., Carrera, P., & Fernández-Dols, J. M. (2015). Are smiles a sign of happiness? Spontaneous expressions of judo winners. *Evolution and Human Behavior*, *36*(1), 52-58.

Darwin, C.R. (1872). *The Expression of the Emotions in Man and Animals*. London: Murray.

Ekman, P. (1965). Differential communication of affect by head and body cues. *Journal of Personality and Social Psychology, 2,* 726-735.

Ekman, P. (1972). Universals and cultural differences in facial expressions of emotions. In Cole, J. (Ed.), *Nebraska Symposium on Motivation* (pp. 207-282). Lincoln, NB: University of Nebraska Press.

Ekman, P. (1980). *The face of man*. New York: Garland.

Ekman, P. (1984). Expression and the nature of emotion. In P. Ekman & K. Scherer (Eds.), *Approaches to emotion* (pp 319-343). Hillsdale, NJ: Erlbaum.

Ekman, P. (1992). An argument for basic emotions. *Cognition and Emotion, 6,* 169-200.

Ekman, P. (1997). Expression or communication about emotion. In N. L. Segal, G. E. Weisfeld, & C. C. Weisfeld (Eds.) *Uniting Biology and Psychology: Integrated Perspectives on Human Development (*Pp. 315-338). Washington, D.C.: APA Press.

Ekman, P. (1999). Facial expressions. *Handbook of cognition and emotion*, *16*, 301-320.

Ekman, P. & Friesen, W. V. (1967). Head and body cues in the judgement of emotion: A reformulation. *Perceptual and Motor Skills, 24,* 711-724.

Fehr, B., & Russell, J. A. (1984). Concept of emotion viewed from a prototype perspective. *Journal of experimental psychology: General*, *113*(3), 464-486.

Fernández-Dols, J. M., Carrera, P., & Crivelli, C. (2011). Facial behavior while experiencing sexual excitement. *Journal of Nonverbal Behavior*, *35*(1), 63-71.

Fernández-Dols, J. M., & Crivelli, C. (2013). Emotion and expression: Naturalistic studies. *Emotion Review*, *5*(1), 24-

Fernández-Dols, J. M., & Ruiz-Belda, M. A. (1995). Are smiles a sign of happiness? Gold medal winners at the Olympic Games. *Journal of Personality and Social Psychology*, *69*(6), 1113 -1119.

Fernandez-Dols, J. M., Sanchez, F., Carrera, P., & Ruiz-Belda, M. A. (1997). Are spontaneous expressions and emotions linked? An experimental test of coherence. *Journal of Nonverbal Behavior*, *21*(3), 163-177.

Fridlund, A. J. (1991). The sociality of solitary smiles: Effects of an implicit audience. *Journal of Personality and Socia Psychology, 60,* 229-240.

Fridlund, A. J. (1994). *Human facial expression: An evolutionary view.* San Diego, CA: Academic Press.

Fridlund, A. J., & Duchaine, B. (1996). 'Facial Expressions of Emotion' and the delusion of the hermetic self. In R. Harré & W. G. Parrott, *The emotions* (pp. 259-284). Cambridge: Cambridge University Press.

Fridlund, A. J., Schwartz, G. E., & Fowler, S. C. (1984). Pattern-recognition of self-reported emotional state from multiple-site facial EMG activity during affective imagery. *Psychophysiology*, *21*, 622-637.

Fridlund, A. J., & Izard, C. E. (1983). Electromyographic studies of facial expressions of emotions and patterns of emotions. In J. T. Cacioppo & R. E. Petty (Eds.), *Social psychophysiology: A sourcebook* (pp. 243-286). New York: Guilford Press.

Goetz, J. L., Keltner, D. & Simon-Thomas, E. (2010). Compassion: An evolutionary analysis and empirical review. *Psychological Bulletin*, *136*(3), 351-374.

Gonzaga, G.C., Keltner, D., Londahl, E.A., & Smith, M.D. (2001). Love and the commitment problem in romantic relations and friendship. *Journal of Personality and Social Psychology, 81, 247*-262.

Gonzaga, G. C., Turner, R. A., Keltner, D., Campos, B., & Altemus, M. (2006). Romantic love and sexual desire in close relationships. *Emotion*, *6*(2), 163.

Johnson-Laird, P. N., & Oatley, K. (1989). The language of emotions: An analysis of a semantic field. *Cognition and emotion*, *3*(2), 81-123.

Keltner, D. (1995). Signs of appeasement: Evidence for the distinct displays of embarrassment, amusement, and shame. *Journal of Personality and Social Psychology*, *68*(3), 441-454.

Keltner, D., & Buswell, B. N. (1997). Embarrassment: Its distinct form and appeasement functions. *Psychological Bulletin*, *122*(3), 250.

Keltner, D., & Lerner, J. (2010). Emotion. In S. Fiske & D.Gilbert (Eds.), *The handbook of social psychology* (pp. 312-347). New York, NY: McGraw Hill Publishers.

Klineberg, O. (1938). Emotional expression in Chinese literature. *Journal of Abnormal and Social Psychology, 33*, 517-520.

LeDoux, J. E. (2015). Afterword: Emotion construction in the brain. In L. F. Barrett & J. A. Russell (Eds.), *The psychological construction of emotion*. Pp. 459 -463. New York: Guilford.

Levenson, R. W. (2011). Basic emotion questions. *Emotion Review*, *3*(4), 379-386.

Levenson, R. W., Ekman, P., Heider, K., & Friesen, W. V. (1992). Emotion and autonomic nervous system activity in the Minangkabau of West Sumatra.*Journal of personality and social psychology*, *62*(6), 972-988.

Leys, R. (2007). *From guilt to shame: Auschwitz and after.* Princeton: Princeton University Press.

Leys, R. (2010). How did fear become a scientific object and what kind of object is it? *Representations, 110,* 66-104.

Matsumoto, D., Keltner, D., Shiota, M., & O'Sullivan, M., & Frank, M. (2008). Facial expressions of emotion. In M. Lewis, J. Haviland-Jones, & L. F. Barrett. (Eds.), *Handbook of emotion,* (pp. 211-234). New York: Guilford Press.

Nelson, N. L. & Russell, J.A. (2011a). Preschoolers' use of dynamic facial, bodily, and vocal cues to emotion. *Journal of Experimental Child Psychology, 110,* 52-61.

Nelson, N. L. & Russell, J.A. (2011b). Putting motion in emotion: Do dynamic presentations increase preschooler's recognition of emotion? *Cognitive Development*. *26*, 248-259.

Nelson, N. L., & Russell, J. A. (2011c). When dynamic, the head and face alone can express pride. *Emotion, 11*, 990-993.

Nelson, N. L., & Russell, J. A. (2013). Universality revisited. *Emotion Review*, *5*(1), 8-15.

Ortony, A., Clore, G. L., & Collins, A. (1988). *The cognitive structure of emotions*. New York: Cambridge University Press.

Ortony, A., & Turner, T. J. (1990). What's basic about basic emotions? *Psychological Review, 97,* 315-331.

Plamper, J. (2012). *The history of emotions*. Oxford: Oxford University Press.

Reisenzein, R., Studtmann, M., & Horstmann, G. (2013). Coherence between emotion and facial expression: Evidence from laboratory experiments. *Emotion Review*, *5*(1), 16-23.

Ruiz-Belda, M. A., Fernández-Dols, J. M., Carrera, P., & Barchard, K. (2003). Spontaneous facial expressions of happy bowlers and soccer fans. *Cognition & Emotion*, *17*(2), 315-326.

Russell, J. A. (1991). Natural language concepts of emotion. In D. J. Ozer, J. M. Healy, Jr., & A. J. Stewart (Eds.), *Perspectives in personality: Self and emotion* (pp. 119-137) London: Jessica Kingsley.

Russell, J.A. (1995). Facial expressions of emotion: What lies beyond minimal universality? *Psychological Bulletin, 118,* 379-391.

Scherer, K. R. (1992). What does a facial expression express? In K. T. Strongman (Ed.), International review of studies of emotion (Vol. 2, pp. 139–165). Chichester, England: Wiley.

Scherer, K. R., & Ellgring, H. (2007). Multimodal expression of emotion: Affect programs or componential appraisal patterns? *Emotion*, *7*(1), 113-130.

Simon-Thomas, E. R., Keltner, D. J., Sauter, D., Sinicropi-Yao, L., & Abramson, A. (2009). The voice conveys specific emotions: Evidence from vocal burst displays. *Emotion, 9*, 838-846.

Tooby, J. & Cosmides, L. (1990). The past explains the present: Emotional adaptations and the structure of ancestral environments. *Ethology and Sociobiology, 11,* 375-424.

Tracy, J. L., & Robins, R. W. (2004). Show your pride evidence for a discrete emotion expression. *Psychological Science*, *15*(3), 194-197.

Tracy, J.L. & Matsumoto, D. (2008). The spontaneous expression of pride and shame: Evidence for biologically innate nonverbal displays. *Proceedings of the National Academy of Sciences*, *105*(33), 11655-11660.

Widen, S. C. & Russell, J. A. (2010). Descriptive and prescriptive definitions of emotion. *Emotion Review, 2,* 377-378.

Wierzbicka, A. (1999). *Emotions across languages and cultures: Diversity and universals*. Cambridge University Press.

Phoebe Ellsworth: On Appraisal Theory, and the Social Uses of Psychology

An Interview With Andrea Scarantino (August 2015)

Phoebe C. Ellsworth is the Frank Murphy Distinguished University Professor of Psychology and Law at the University of Michigan, Ann Arbor. She has been a Fellow of the American Academy of Arts and Sciences since 1992, and her recent awards include the SPSP Career Contribution Award and the Nalini Ambady Award for Mentoring Excellence in 2014 and the APS James McKeen Cattell Award in 2015. One line of her research involves the relation between cognition and emotion and, along with Klaus Scherer, she is one of the originators of appraisal theories of emotion. Her other line of research involves the application of Psychology to Law, with particular focus on jury decision making and the death penalty. She has been a member of ISRE since it was founded, and is Vice President of the board of the Death Penalty Information Center. Her most recent articles have appeared in the Alabama Law Review (Meador Lecture Series), Psychological Review, Emotion Review, and Psychological Science.

Where did you grow up? What are your memories of family life as a young woman? Did you have academic role models within your family?

I grew up in Connecticut in a family that was emphatically grounded in New England, with the exception of a sprinkling of Cubans and a few New Yorkers. The emotional climate was temperate. My father went back to graduate school when the War was over, soon after I was born, got his PhD in sociology, and was an assistant professor at Yale until he didn't get tenure, after which he worked in Yale administration until he retired. My mother might have been an archaeologist, but she got married instead.

Phoebe at age 5

I began my education in a one-room schoolhouse with about 25 children in five grades. Miss Kelly gave us work that fit our abilities in each subject, so I usually did reading and writing and geography and history with the kids a couple of grades ahead of me, and arithmetic with my own grade. I was a fairly solitary child, not popular, but I don't remember being particularly lonely, except in middle school. I was interested in almost everything, and spent my outdoor time in the woods observing plants and animals and my indoor time mostly reading and drawing.

Phoebe's elementary school, New Canaan, Connecticut

My husband says that I was a natural born academic, but if so, I was certainly unware of it. However, my parents' friends were mostly academics, including some women, such as the anthropologist Bea Whiting, so at least I knew that being a woman professor was possible. But the general view at the time was that women should get college educations in order to be fit companions for intelligent husbands.

You studied social relations at Radcliffe College and got your PhD in social psychology at Stanford University in 1970. Were you always interested in the social dimension of human life? Did you ever consider studying something completely different? What classes and teachers had a deep influ-

ence on you at Stanford University? What topic did you write your PhD thesis on?

Until the end of college I had no thoughts of a career in Psychology. For one thing, it was fairly rare for women to consider careers in anything, and for another, college students in the 60's were far less career-oriented than they are now. We wanted to learn everything, we wanted to change the world, and we gave little thought to dull topics like paying jobs, vaguely figuring that mundane issues like that would somehow work themselves out in the future. I thought I'd like to be an artist or a writer.

Phoebe on a motorcycle, circa 1965

I dropped out of college for a semester and was hired as "office help" by three Yale social psychologists – Barry Collins, Chuck Kiesler, and Norman Miller — but I was a failure as office help and so became a research assistant. My Yale employers and several Harvard professors told me that I had a real knack for research design. This did not strike me as a particularly glamorous skill, but I believed that people were most likely to make a contribution by doing things that they were good at, and since I had no other ideas about what to do next, I applied to graduate school.

At Stanford my advisor was Merrill Carlsmith, who was a brilliant statistician, an extremely competitive person, and not given to praise. He never told me that any of my ideas were good, but he pretty much let me do what I wanted. It was a good collaboration because Merrill never got interested in a question until the data were collected and he could start doing interesting statistical analyses, whereas once I had calculated the means, I was thinking about what the next study should be. He taught me how to really look at data and learn from them.

The course that made the biggest impression on me was Walter Mischel's course on Personality, in which the main text was the draft of his revolutionary book, *Personality and Assessment* (Mischel, 1968). The central argument of this book was that personality traits do not predict people's behavior very well. People respond to their immediate situation, and if you want to know what they will do, you're much better off knowing what situation they're in than what their score is on any personality test.


Phoebe's drawings: 1

In every class we had passionate arguments, as most of us had always believed that personality was fundamentally important, but in the end the concept of the power of the situation had become a permanently available concept to me, in research as well as in life. I realized that one of the main reasons that people seemed consistent to me was that I always saw them in the same situation, and forever after when I see someone behaving badly I think "What circumstances are making them do that?" This was a genuinely new insight for me, and has made me not only a better scientist, but a more tolerant person.

The person I admired most at Stanford was Al Hastorf. Intellectually, Hastorf and Cantril (1954) showed me that different people perceive the same situation differently, which is an insight that informs appraisal theory, although I'm not sure I was consciously aware of the connection when I was first thinking about appraisal theory. Interpersonally, Al was able to talk to anyone in a way that made the person feel interesting and valuable, and was able to accomplish his goals as an administrator without making enemies. Lee Ross joined the faculty as a new assistant professor when I was still at Stanford, and was more available than other faculty for endless intense conversations that led to a li-

felong friendship.

In my dissertation, I studied whether submission gestures (lowered gaze) forestalled aggression in humans as they do in other primates (Ellsworth & Carlsmith, 1973). The answer is “sometimes”. I did some follow-up research on non-verbal cues, but I eventually moved on – at the time the field of nonverbal communication seemed destined to stay on the periphery, and I didn’t want to become an aggression researcher because most of the aggression researchers I knew were pretty aggressive people, and I didn’t want them to be my closest colleagues.

When you were a graduate student at Stanford University, you spent the summers of 1967 and 1968 working in Paul Ekman’s lab at the Langley Porter Neuropsychiatric Institute in San Francisco. As you report in your paper “Basic Emotions and the Rocks of New Hampshire”, you helped him select the famous pictures he used during his field trip to Papua New Guinea to argue that facial expressions of basic emotions are universally recognized. Was the way in which the pictures were selected problematic to establish that conclusion? More generally, what is your view on the role of the cultural context in the recognition of facial expressions?

I was very interested in nonverbal communication and emotion at that time, but nobody at Stanford considered them important topics, which is why I was eager to work in Paul Ekman’s lab during the summer. I worked on designing a facial coding scheme based on pictures. At that time Paul and Wally Friesen were developing a verbal method for coding facial expressions, with terms like “slight squint”, “moderate squint”, “extreme squint”, “lips relaxed”, “lips pursed” and so on. I thought that words added an unnecessary complication and were likely to increase error, and I made a bunch of drawings to *show* the facial changes rather than describing them.

Phoebe with Paul Ekman and others, when Ekman was awarded the APA Distinguished Scientist Award

Paul thought that it would be much better to use photographs than drawings, so I spent a lot of time taking pictures of people and selecting eyes, brows, and mouths that were clear examples of various components of emotional expression. The coding system was called The Facial Action Scoring Technique (FAST; Ekman, Friesen, & Tomkins, 1971). It didn’t last long. Paul and Wally soon developed FACS, which was a much more detailed anatomically based system.

I also worked on the cross-cultural research. In those days a prevalent point of view was that facial expressions were culturally based and had no intrinsic meaning, and that emotions were based on people’s construction of the situation. Every introductory psychology textbook had a picture of someone showing an intense emotion like a tearful screaming face and asked readers to say what it was. The reader would say something like “agony” and then two pages later the face would be shown with its whole context – the screaming woman had just been told that she won the Miss America contest, and the text would say, “Ha,ha — see how wrong you were. Facial expressions are not a valid indicator of what a person is feeling.”

We thought that this was too extreme, and wanted to find out whether any facial expressions had the same meaning across cultures. I went through the stimuli used in all of the old facial expression studies and chose the pictures that had gotten the highest levels of agreement (mostly among Western Subjects) and then pilot tested them again on Stanford students to make sure that they were still interpreted in the same way. I didn’t go to New Guinea.

Given that our goal was to discover whether there was *any* cross cultural agreement in the recognition of facial ex-

pressions, we thought it was appropriate to choose the faces that were most likely to elicit agreement, and I still think that was the appropriate method. If the common hypothesis had been that facial expressions did have the same meaning across cultures, then it would have made sense to choose much more ambiguous faces as providing the best chance of showing cultural variability.

Phoebe's drawings: 2

We never thought that *all* facial expression would be interpreted in the same way across cultures, but that it would be very important to discover whether *any* did. And it turned out to be even more important than we had expected. It changed the way psychologists thought about emotion, and pictures from Ekman's research replaced Miss America in the textbooks. Of course culture plays a role. It influences the situations that people see as emotionally significant, the kinds of emotional experience that are salient in people's minds and therefore accessible and common, the emotions that are considered appropriate, and the ways that they should be expressed. And of course there is wide variation in emotional experience and expression within cultures (Ellsworth, 1994a).

One of the distinctive aspects of your remarkable academic profile is that you have interests and expertise both in emotion theory and in the intersection between psychology and law. When and how did you get interested in emotions on the one hand and in the intersection between psychology and law on the other hand?

Phoebe in graduate school, 1969

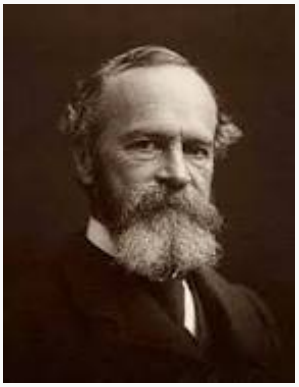
I was always interested in doing both basic research and research that would have more immediate relevance to social problems. I first became interested in law in a course on legal and criminal psychology taught by Hans Toch at Harvard, possibly the first of its kind. I thought that my law research was more like a "good deed", like volunteer work, and had no idea that it would actually contribute to my career. I felt that if legislators and judges were going to make important decisions based on their assumptions about human behavior, they should have accurate scientific information about human behavior, rather than relying on their own intuitions.

My first psychology and law article was written with a law professor (Ellsworth & Levy, 1969) who was working on designing policies for child custody. I was surprised that he knew nothing about the relevant research in developmental psychology, and offered to review the literature for him. Policies about capital punishment and jury decision making were also being set without much knowledge of relevant research. For example, in 1970 the Supreme Court decided that there was no difference in the behavior of six-person and twelve-person juries (*Williams v. Florida*), and in 1972 they decided that whether or not there was a rule requiring unanimity would make no difference in jury behavior (*Apodaca et al. v. Oregon*).

Like many other psychologists, I was upset that decisions that had such major and permanent consequences could be made without any evidence. Further research by Michael Saks on jury size, Reid Hastie on unanimity, and many others showed that both size and unanimity do make a difference. Smaller juries are less representative and less predictable. Non-unanimous juries are less thorough in their deliberations and less likely to consider the views of jurors

who disagree with the majority. I had already been working on legal issues before these decisions, but they strengthened my resolve. I believed that judges ought to consider relevant scientific research, but also that scientists had an obligation to produce research that was relevant.

You have argued in an influential paper entitled "William James and emotion: Is a century of fame worth a century of misunderstanding?" (1994) that William James' views on emotions have been largely misunderstood. Your analysis has elicited several critical responses over the years. Now, 20 years after that contribution, do you still think James' position is systematically misrepresented, and if so how?



William James (1842-1910)

I argued that the common view of James's theory was an oversimplification, not that James's position was "systematically misrepresented", certainly not by scholars of his work. The common oversimplification was to say that James believed that emotions were nothing but the perception of one's bodily sensations. What he actually said was that "the bodily changes follow directly the perception of the exciting fact" and that they are necessary for the experience of emotion, but "the perception of the exciting fact" was largely ignored in later discussions of the theory. And by "perception" he did not mean mere sensation; he meant a perception of the "total situation", so a bear in the woods would elicit a very different emotional response than a bear in the zoo.

So I argued that James's theory was consistent with appraisal theories of emotion. I think that none of us can definitively answer the question "What did William James really mean?" For one thing, although he could clearly describe the ideas he didn't believe, when it came to what he did believe he was curious, speculative, complicated, and sometimes apparently contradictory. He was trying to focus the field on asking the right questions, and I don't think he believed he had the final answers. Nor do we (Ellsworth, 1994b; Ellsworth, 2014).

Your work on emotional appraisal has been seminal. Could you reconstruct what got you interested in the appraisal dimension of emotions, and illustrate the core components of your current theory of appraisal, pointing to changes of your theory over time, if there have been any?

In the 1970's Paul Ekman, Cal Izard and I were thinking of submitting a proposal to NASA on the utility of using facial expression as a means of regulating emotion. This idea was based on Silvan Tomkins's ideas on the role of facial feedback in producing emotions. We thought we needed to include some preliminary research to indicate the value of this approach, and I was designated as the one to do it. Along with Roger Tourangeau, I designed and ran a study in which we showed people sad or scary films and posed their faces into sad or fearful expressions, so as to look at the relative influence of the situation and the facial feedback. We found that people's emotions were powerfully influenced by the films rather than by their faces (Tourangeau & Ellsworth, 1979).

So then the question became: What is it about the situation that leads to emotions? And clearly the driving force had to be people's perceptions of the situation rather than the situation itself, given the obvious fact that different people can have very different emotional responses to the same situation. Schachter and Singer (1962) had proposed that people's perceptions of the situation matter, which was a big contribution, but didn't go further and ask what it is about people's perception of the situation that matters.

Many theories had proposed that arousal and valence were crucial dimensions differentiating emotions, but I didn't think that these two dimensions were enough to account for the richness of emotional experience. For example, fear, fury, and anguish are all negative and all intense. So I spent years, working with Ira Roseman and Craig Smith, who were graduate students, trying to figure out what other situational appraisals were fundamental in differentiating people's emotional responses.

When we were just starting the first big empirical research project on the theory, Klaus Scherer gave a talk at my lab, and we were both stunned to discover that our theories were nearly identical! This convergence gave us confidence in the validity of the theory. I am quite proud of us for feeling pleasure and excitement about the similarity of our theories,

not fighting over the credit or wasting our time addressing the small dissimilarities, but seeing it as the same basic idea and thinking about how we could test, develop, and extend the point of view, working as collaborators rather than competitors.

Phoebe with older daughter Sasha, 1988

Over the years the theory has been clarified and extended and I expect that it will continue to be. It always annoys me when people assume that my ideas today are exactly what they were in 1985, when Craig Smith and I published our first article on appraisal theory (Smith & Ellsworth, 1985).

Some critics have argued that things other than appraisals can elicit emotions. Candidate alternative mechanisms have included facial feedback, chemical induction, brain manipulation and exposure to music. What is your answer to this critique? Are appraisals strictly necessary for emotion elicitation?

I don't believe that all emotional experiences are elicited by appraisals, and in fact I'm not sure that "elicit" is the right word, if it is a synonym for cause. Brain stimulation can elicit all sorts of things – thoughts, images, behaviors — and I expect that chemical induction may too, since it operates through brain stimulation. Facial feedback may play a role in modulating emotions, but the research I did with Roger Tourangeau persuaded me that people's perception of the situation is far more important, and then there's always the vexing background question of what tells the face what to do – quite a few brain processes must intervene between the retina and the face.

Music is a more difficult challenge, as I pointed out in 1994 (Ellsworth, 1994c), and can evoke emotion in several ways – through memory (as when the music is associated with an emotionally-charged person or event), through the association of the rhythm with an action tendency – a strong loud rhythm may suggest striking, a descending scale may suggest falling, a soft, slow even melody may suggest resting, through aesthetic appreciation, through the sense of mastery that comes from familiarity. In adults, who have experienced emotional patterns of appraisal and their associated physiological responses and action tendencies many times, any component may elicit the others, so when we hear the loud strokes of the *Dies Irae* in Verdi's requiem our physiological responses and action tendencies evoke the appraisals and feelings of determination and anger. But Klaus Scherer is the real expert on this.

At this point, it is hard to find an emotion theorist who would deny that emotions are elicited by appraisals at least in standard cases, provided we allow appraisals to range from primitive to sophisticated forms of information processing. But I presume accepting this tenet is not sufficient for being an appraisal theorist, or we would have to count pretty much everyone as an appraisal theorist. So what ultimately distinguishes appraisal theory as a research program from research programs generally considered as competing with it, such as basic emotion theory, dimensional theories, psychological constructionism, and social constructionism?

Well, the fact that you'd count everyone as an appraisal theorist suggests the success and utility of the theory. You wouldn't have said this in 1980. Most theorists now allow that a person's perception of the situation is a major component of emotion. Schachter and Singer said this, but left it very vague. What appraisal theorists did was to specify the kinds of perceptions of the situation that were most crucial in differentiating emotion: novelty, valence, certainty,

agency, goal conduciveness, control (or effort), and compatibility with norms.

These appraisals will distinguish most common emotional experiences, including the emotions postulated in Basic Emotions theories. But appraisal theory differs from Basic Emotion theories in that it allows for emotional experiences that do not fit neatly into categories such as Joy, Sorrow, Fear, Anger, Disgust, Surprise, and Contempt – or any other theorist's list – while still being able to specify the appraisals that distinguish among these emotions. Appraisal theories see emotional experience as a dynamic process, constantly changing. As an appraisal changes, so does the emotional experience. A person can have an undifferentiated negative feeling, and further appraisals may transform that feeling into sorrow or anger or anxiety or any number of other states, even positive states. Very often we feel emotional but don't fit into any of the categories common to basic emotion theories.

In some ways appraisal theories *are* dimensional theories, and in my first article on appraisal theory (Smith & Ellsworth, 1985) we reviewed dimensional theories and discussed appraisal theory in that context. Each type of appraisal is an appraisal *dimension*, so that a person may appraise a situation as anything from mildly positive to intensely positive, or see a situation as anything from totally under one's control to totally out of control. There are more dimensions than in most other dimensional theories, but they are dimensions in the sense that a person can range continuously from very low to very high on any one of them, and they create a huge multidimensional space in which any point is theoretically possible, whether or not it corresponds to a labeled category or basic emotion.

Phoebe's drawings: 3

Appraisal theories are also constructionist theories in that emotions correspond to the *environment as appraised*, and two people may appraise the same event in different ways depending on their goals, their experiences, and their cultural and personal values and beliefs, and feel different emotions. But appraisal theories are more specific than other constructionist theories in that they specify the constituent elements from which emotional experience is constructed. If you know how a person appraises a situation on the dimensions of novelty, valence, certainty, agency, goal conduciveness, control, and compatibility with norms, you have a pretty good idea of her emotional experience.

You have explored the role of culture in appraisal in your collaborative work with Batja Mesquita. It seems clear that there are cultural differences in the way some stimuli are appraised in different cultures (e.g. eating pork may be appraised as disgusting or as delightful depending on the culture), but also that there are universal antecedents in the elicitation of some emotions (e.g. sudden loss of support elicits fear in all cultures). How can we make sense of both aspects jointly?

It seems to me far more plausible to say that some situations are appraised very similarly across cultures and some are not than to say that either all situations are appraised in the same way (an extreme universalist point of view) or that no situations are appraised in the same way (an extreme relativist point of view).

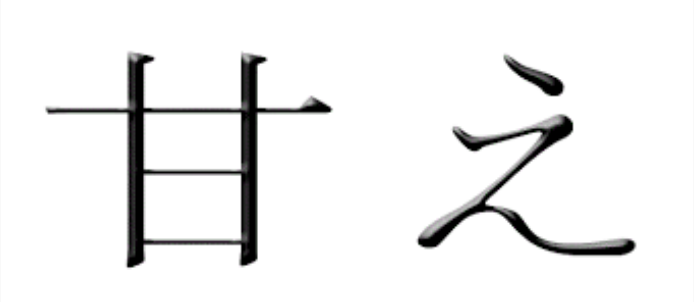
Human beings belong to the same species. Our brains, bodies, autonomic nervous systems, hormones, and sense organs are similarly constructed, and our consciousness is shaped by the constraints and opportunities they provide. Human environments everywhere include novelty, hazard, opportunity, attack, success, failure, and loss, which people must perceive with some accuracy and respond to appropriately. These are the kinds of events that generate emotion, and many scholars believe that the primary function of emotion is to move the organism to appropriate action in circumstances consequential for its well-being.

However, it is also clear that cultures differ in their definitions of novelty, hazard, opportunity, attack, success, failure, and loss and in their definition of appropriate responses. They differ in their definitions of significant events and in their beliefs about the causes of significant events, and these differences affect their emotional responses. They differ in their beliefs about which emotions and which expressions of emotion are desirable or undesirable, and how they should be regulated.

I think the question is not "how can we make sense of both aspects jointly?", but "how can we possibly understand em otions without taking account of both aspects?" What is needed is a framework that allows consideration of the general and the particular at the same time (Ellsworth, 1994a).

Amae, often defined as an emotional state of child-like attachment towards authority figures, is commonly presented as a uniquely Japanese emotion. Yet, in your work you argue that amae exists also in the US. How so? And do you think that there are any emotions that are culturally specific in the sense that you do not find them in any other culture?

Amae is common in Japan. There is a word for it, and it is what Nico Frijda and Batja Mesquita called a focal emotion. Americans, who greatly value independence, have a hard time understanding the concept, which involves the enjoyment of dependence. Americans can understand it if they think of a child's feelings towards its mother, but find it hard to understand as a positive feeling between adults. Nonetheless, if you ask Americans if they can remember a time when they were in a specific *situation* of the sort that elicits *amae*, they can often do it.



Amae in Japanese

We asked people to describe a situation in which they asked a friend to do a fairly big favor for them and the friend agreed, or when a friend asked them for a favor. They put themselves in a position of dependence on the other person, and they tended to report positive emotions. Japanese people who read these descriptions saw them as *amae* situations (Niiya, Ellsworth, & Yamaguchi, 2006). Thus *amae* can be experienced by Americans, although *amae* situations might be quite rare in American culture, or they could be fairly common but go unnoticed because the concept is unnamed and unavailable.

In general, understanding the emotions of people in another culture involves appraising their situations in the same way that they do. Filmmakers and novelists portray events so that the audience can see them as the characters do, and thus share the characters' emotions. Josh Wondra and I have also proposed that this is how empathy works: when we appraise another person's situation in the same way that she does, we feel what she feels: We empathize (Wondra & Ellsworth, in press).

A wide range of diverse elicitors, ranging from maggots to hypocrisy, can cause disgust. This raises the

question of whether disgust is just an umbrella term we use to refer to importantly different emotions, or whether disgust is a unified emotion. What are your views on the matter?

I am not a believer in "unified emotions". The English term "disgust" is used for a range of aversive states, some closely related to anger – such as our reactions to hypocrisy or injustice, some more closely related to fear – such as our reactions to maggots, with many other shades and nuances possible. Various scholars have dealt with this by proposing a basic "real" disgust and considering usages that don't fit their definition of real disgust as metaphorical extensions, or by proposing a "primary" disgust (typically physical disgust) and a "secondary" disgust (typically a more culturally variable moral disgust), and there is some evidence for overlapping but distinctive brain processes corresponding to these.

What is referred to as moral disgust generally involves a human agent, and thus closely resembles anger, which is a response to something bad caused by another person. It also involves a desire to punish, and a sense of dominance and righteousness, all of which are absent in cases where there is no human agent, which are often more similar to fear (Lee & Ellsworth 2013) in that the perceiver feels vulnerable and is more concerned with escape and self-protection than with punishing anyone. As the appraisal changes, so does the emotion. I believe that there are many intermediate states and other subtle variations in the experience of disgust, and that the categorical distinctions (between physical and moral disgust, or between moral disgust and anger) are arbitrary and culturally determined, although once these distinctions exist in a person's mind they are important and real in their consequence

Let us transition to your groundbreaking work at the intersection of psychology and law. You have written on eyewitness testimony, child custody, jury bias, the death penalty and many other pivotal topics, trying to use the tools of social psychology to improve our legal system. In which of these areas do you think social psychology research has been more successful in bringing about positive changes? Which of these areas is still sorely in need of radical reform in light of what empirical research tells us?

I think the biggest changes have probably been in the area of child custody, where joint custody arrangements have largely replaced the old preference for giving custody to the mother. One reason is that although judges tend to regard themselves as experts on most topics, they recognize that they are not experts on children, and so are more open to information from psychologists. Legal changes are sometimes top-down, with the Supreme Court declaring a practice unconstitutional, as in *Brown vs. Board of Education*, but often they are bottom up, with a few, then many, then most jurisdictions changing their practices, sometimes in response to psychological research.

The Supreme Court of the United States

The fallibility of eyewitness testimony has become much more widely recognized than it used to be, largely due to the work of Beth Loftus and other psychological researchers, and many police departments are changing the ways in which they conduct lineups and document the identification procedure in order to reduce suggestion and increase accuracy. Likewise the practice of videotaping interrogations has become much more common due to the evidence that some innocent people have confessed to crimes, and the psychological research on false confessions.

Research on capital punishment has been much less influential. Although there are many empirical issues related to capital punishment, such as the deterrent effect of the death penalty, racial discrimination, and the fairness of juries that exclude opponents of the death penalty, it is often seen as fundamentally a moral issue, and so courts have sometimes considered empirical evidence to be irrelevant. I think that this is slowly changing: In the past 15 years the Supreme Court has banned capital punishment for intellectually disabled people (*Atkins v Virginia,* 2002) and for juveniles (*Roper v Simmons,* 2005) in part based on psychological research, and some states have abolished the death penalty. The continued use of the death penalty in

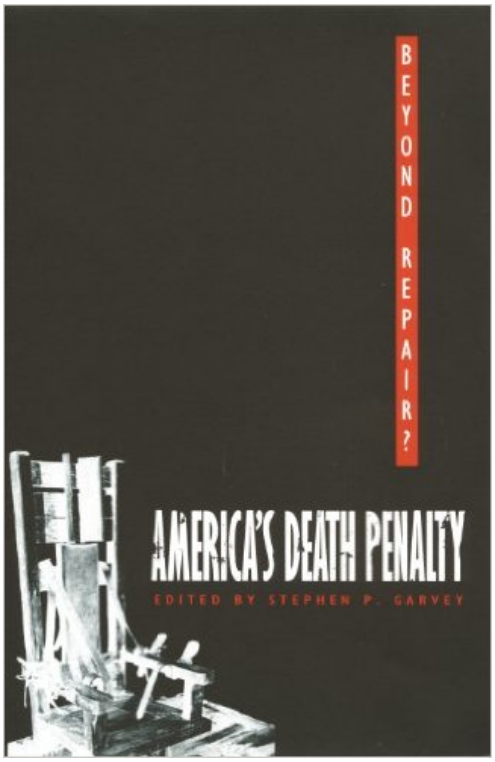
the United States will of course strike most European ISRE members as bizarre.

You spent the 1970s as a psychology professor at Yale University, but started going back to Stanford to work with Samuel Gross, who was then challenging the constitutionality of death-qualified juries, and later became your husband. At the heart of the case for which you eventually became expert witness was the claim that empirical research shows that weeding out prospective jurors who are against the death penalty biases the trial against the defendant. What evidence did you rely on to support this claim? The case reached the US Supreme Court but ultimately lost. What did this experience teach you about the extent to which scientific facts matter to legal decisions at different levels of the hierarchy of courts? You still are a board member of the Death Penalty Information Center. What is the objective of the Center? And finally, how hard is it to write papers with one's spouse?

Well, actually Anthony Amsterdam was the famous lead lawyer in that case, and Hans Zeisel was the famous lead expert witness. The practice in capital cases is to exclude anyone who is adamantly opposed to the death penalty from serving on the jury because those people wouldn't be able to follow the law and vote for the death penalty if it were called for. I was at Stanford on sabbatical from Yale, and conducted four studies (all published in *Law and Human Behavior,* 1984) that showed that the people who were allowed to serve on capital juries (the "death-qualified" jurors) were more pro-prosecution and more likely to find the defendant guilty than a jury that reflected the views of the whole community. By that time there were also eleven other studies that had found that death-qualified jurors were more conviction-prone, and I testified about all 15 studies.

In 1986, when the case came to the Supreme Court (*Lockhart v McCree*), the Court was highly unlikely to accept any arguments that challenged capital punishment. We had hoped that they would see this as a case about jury fairness, more than as a case against the death penalty, but it was a pretty feeble hope. The Supreme Court opinion plodded through all the studies one by one, finding a flaw in each one and so eliminating them from consideration until only one was left, and then said that "surely a 'per se constitutional rule' as far reaching as the one McCree proposes should not be based on the results of [a] lone study…" (476 US 172). This process of elimination, of course, is totally at odds with the idea of convergent validity, where a collection of studies using many different methods (surveys, experiments, interviews with real jurors) all converge on the same conclusion, providing strong evidence even if individual studies have flaws.

For good measure (and perhaps in order to forestall future flawless studies) the Court decided that after all death qualification was not an empirical issue, so no future research would be relevant. A year later they similarly rejected very powerful evidence of racial discrimination in the application of capital punishment. This suggests that empirical data are likely to be unpersuasive when they challenge judges' strongly held beliefs, in this case the belief in the acceptability of capital punishment.



The Death Penalty Information Center is an organization that collects and keeps up-to-date information on capital punishment – the number of people on death row, executions, and new death sentences in each state; racial issues; wrongful convictions; cost of the death penalty; new empirical research, and a host of others. It is where the media, the public, and students go to get accurate information. On issues that involve passionate attitudes, accurate information is hard to come by, and the goal of the Death Penalty Information Center is to provide it.

Although the issue of death qualification lost in the Supreme Court, various jurisdictions have used the research in attempts to reform procedures in capital cases. And although it was not much of a success in the policy realm, it was a stunning success in the personal realm: Sam Gross and I fell in love and got married, and so did two of the graduate students who worked on the research with me. Sam and I have continued to write together on the death penalty.

"How can you write articles with your husband and stay married?" is one of the most common questions I get about my work in this area, along with "How could you let a man on death row write to your four-year-old daughter?" I actually find it easier to write articles with Sam than with anyone else, and often when we reread our work we can't remember who wrote which parts. This may be because we worked very intensively together for nine months before falling in love, so we already had a deep knowledge and admiration for each other as collaborators.

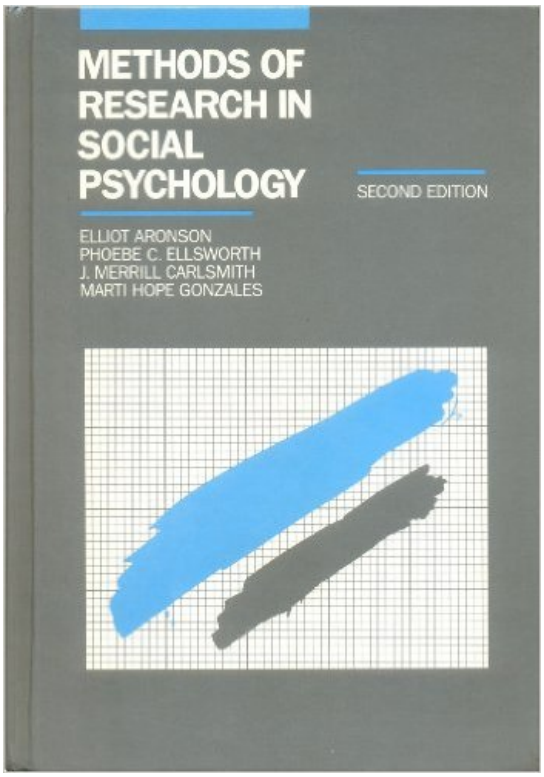
In one of your highly influential papers on racial bias in courts – "White Juror Bias", co-authored with Samuel Sommers – we find the following poignant quote from *To Kill a Mockingbird* by Harper Lee: "in our courts, when it's a white man's word against a black man's, the white man always wins…The one place where a man ought to get a square deal is a courtroom, be he any color of the rainbow, but people have a way of carrying their resentments right into a jury box". We have come a long way from Atticus Finch's Alabama, but in some of your work you have argued that there is still significant racial bias in juror decisions. What is the main evidence for this claim? And is there anything we can do to get rid of racial bias in juror decisions once and for all?

Racism in America is pervasive. In every city and town where both Blacks and Whites live, they live largely in segregated neighborhoods. Racial bias on juries is a tiny manifestation of a far more general problem. Even in the criminal justice system, discrimination begins long before the few cases that are tried by juries ever get to trial: There is discrimination on who is stopped, searched, arrested, and charged, in who can make bail, and what kind of lawyer is affordable. Racial minorities are hugely overrepresented in jails and prisons, but most of them were not convicted by juries. Most people plead guilty or are tried by judges. On juries, there are rules to prevent an attorney from striking all the Black jurors and instructions designed to reduce prejudice. These measures are far from completely effective, but it is probably easier to reduce prejudice on juries than in many other situations (Sommers & Ellsworth, 2001).

You have co-authored a book on *Methods of Research in Social Psychology*. You have also been Associate Editor of the *Journal of Experimental Social Psychology* (1977-80), currently are Associate Editor of *Emotion Review (*2014-) and sit on many editorial boards of top journals. You therefore seem to be ideally situated to say whether what gets published in social psychology journals tends to be as methodologically rigorous as it

should be. More generally, should the quality of published scientific research in social psychology and/or emotion theory improve, and if so in what ways?

There is out-and-out fraud, and that of course is unacceptable. Then there is the much more complicated issue of data analysis, on which a great deal is being written by people with more expertise than mine. I have never believed that everything that is written in psychological journals, or any other scientific journals, is true. When we write an article we say, "This is what I think is true now, and this is why I think it." Other scholars may think, "That's interesting, and I'll explore it further", or they may think, "That's dumb – she doesn't realize that her treatment or her measure or her reasoning is flawed, and I will do the study that she should have done."



I think that there is a value in publishing interesting, provocative ideas even if the data are weak. If other people are interested they will follow up on the ideas, sometimes trying to extend them and sometimes trying to disconfirm them. The ideas are discussed and criticized, and the field is invigorated by these discussions, even if the original ideas turn out to be wrong. I think it is unrealistic to expect a researcher to raise, examine, and settle a question in in one article, and that if this can be done it usually means that the questions are pretty pedestrian. That is not how science works. Experiments are not just a series of true/false tests. For me the best research is research that gets us thinking and suggests ideas and questions we hadn't thought of before.

Nonetheless, I do worry about the quality of the research. Over the course of my career, success has become increasingly judged by the number of studies run and the number of articles published, and this inevitably lowers the average quality of the articles, as in any speed-accuracy tradeoff. Young scholars know that getting a job and getting tenure depend on having a lot of publications, and so waiting to publish until the empirical support is unimpeachable is likely to result in fewer publications and lessen a person's chances of success. Many schools even suggest that a certain number of publications is *required* for getting tenure, which puts scholars who are actually seeking the truth in an excruciating dilemma.

I think that two very good studies are worth more than ten mediocre ones, and I wish that the person who did the two studies would have better chances of promotion and success than the person who did the ten. When I was young I withdrew an already-accepted study from JPSP because I thought the findings needed more support, and the article that was finally published was much better. My career was not damaged by this choice. If anything, it was helped, as Bill McGuire, the editor of JPSP, who had never heard of me before, paid attention to my work and admired me from then on. Nowadays I fear that this sort of perfectionism is likely to hurt people's careers.

I also worry that some of the recommendations seem to assume that there are methods that are intrinsically superior and methods that are intrinsically inferior. I believe that different questions require different methods (Ellsworth & Gonzalez, 2003). In my field, for example, some scholars have tried to define the best verbal measure of emotions, the best set of stimuli for testing perceptions of facial expressions, the best methods for eliciting different emotions, etc., all in the interests of creating standardization across the field. This enterprise is likely to fail.

First, it totally confounds the concept with the method. Second, the emotions I want to ask about depend on what I want to know – so if I want to find out about how feeling angry at oneself differs from feeling angry at someone else, I will want to ask a lot of fine-grained questions about varieties of anger, but I won't need any of the items a Positive Psychologist would need to differentiate among positive emotions. A standard measure is unlikely to capture what I'm looking for. Or if it does, it will also include dozens of distracting, time-consuming questions that are irrelevant to my

purpose.

Third, perceptions and customs change over time, more and more rapidly. Words fall out of use and new ones replace them, and even when the same words are used their meanings change over time. In the 21st century a verbal measure has a short shelf life. Stimuli that aroused fear 50 years ago (like the special effects in horror movies) may just be seen as ridiculous now, and stimuli that would have gone unnoticed (like a whole classroom taking turns drinking out of the same cup) may be regarded as disgusting. “Standardized” treatments and measures do not mean the same thing across time and place, and seeking such standardization is an effort doomed to failure.

I also believe that direct replication in social psychology is impossible. When people ask me to send them the stimuli I used 25 years ago so that they can conduct a “direct replication” I am reluctant. The times have changed, the people have changed, and if I wanted to replicate the findings myself I would be unlikely to think that the 25-year-old materials are the best ones to use now. I have heard that some of the groups that claim to do direct replication actually run Subjects through five or ten of the experiments to be replicated in a row. This does not result in direct replications: If you run a study of mine right after a study of aggression I would not expect it to have the same results as it would if you ran it right after a study of compassion. If we have learned anything in our field, it is that context matters.

You have received many teaching awards in your career, including the Dean’s Award for Distinguished Teaching, Stanford University (1984), the American Psychological Association Distinguished Lecturer Award (1999), the APA Association of Graduate Students (APGAS) Raymond D. Fowler Award for outstanding contributions to students’ professional development (2011) and the SPSP Nalini Ambady Award for Mentoring Excellence (2014). What do you think makes you a successful teacher and mentor? Do you think university professors as a group should work harder to improve the quality of their teaching and mentoring? How could they do so?

When I was in graduate school, Phil Zimbardo gave us all feedback on our teaching ability, and although he tried to be kind, he did not have high hopes for me as a teacher. And in fact I could never be a charismatic teacher like Phil because I can’t keep track of what I want to say, how the class is responding, and a dizzying array of audio-visual aids and special effects at the same time. I work hard and I care about students and I got better over time.

PhD party for Eddie Tong, 2006

An important part of a professor’s job is training graduate students to become the next generation of psychological scientists. Treating them like research assistants that we have hired to work on our own projects is not enough; it’s also important to help the students to make their own research and their own ideas as good as they can possibly be. This may be easier for me than for some people, because I find solving methodological problems intrinsically interesting. And the students have been wonderfully generous about nominating me for awards.

What are your hobbies?

In addition to teaching and two entirely different lines of research, I have been a wife and a mother, so “hobbies” have not been on the agenda, except for functional ones like cooking and gardening. I also read something that’s not psychology every night before going to sleep, history or literature usually. I like to travel, and I like to draw. I draw Christmas cards every year, and occasionally other cards for people.

You now live in Ann Arbor, where you hold the position of *Frank Murphy Distinguished University Professor of Psychology and Law* at the University of Michigan. What do you like and what do you dislike about living

in Ann Arbor? What are a handful of your favorite restaurants in town? Do you enjoy cooking, and if so do you have a favorite recipe to share?

We moved to Ann Arbor from Stanford when our daughters were ages one and five. It is a great place to combine careers and family – safe, culturally rich, good public schools, and a world class university. It's a little smug and Norman Rockwellish, but neither of these is a severe drawback. I've missed the edginess of New England and Sam misses Berkeley – and perhaps reflecting our backgrounds one of our daughters is now in Providence and the other in Berkeley – but on the whole it was a good choice.

Ann Arbor, Downtown

Ann Arbor has Zingerman's, one of the best gourmet delicatessens in the country, and for lunch on weekends we have their top-class cheeses, baguettes, and salami. Restaurants I like are Pacific Rim and Mani Osteria.

I'm from New England, which is not the gourmet capital of the world, but here's a recipe:

Mussels with Roasted Potatoes (for 4)

4 large Yukon Gold or baking potatoes

6T olive oil

½ t salt

1/3 C finely chopped shallot

3 minced garlic cloves

¼ t red pepper flakes

1 C white wine

¾ C water

2lb mussels

3T chopped parsley

Preheat oven to 450


Phoebe's Mussels With Potatoes

1. Halve potatoes lengthwise and cut off a ¼ inch slice from round sides to make 8 slabs ½-3/4 inch thick.
2. Coat slabs with 2 T oil and sprinkle with salt.
3. Put in one layer in a large shallow baking dish and roast 25-30 minutes, turning over halfway through, until golden brown.
4. Meanwhile, over medium heat, cook garlic, shallot, and pepper flakes in 2 T oil in a deep 12-inch skillet, stirring, 3 minutes.

5. Add wine and water, bring to a simmer, add mussels and cook, covered, over medium high heat until mussels open, about 3 minutes, transferring to a bowl as they open. Stop after 6 minutes.
6. Whisk parsley and 2T oil into mussel broth and season with salt and pepper.
7. Divide potatoes among 4 shallow bowls and top with mussels and broth.

What are you working on these days?

I continue to work on the development and extension of appraisal theory, including new work on empathy and other vicarious emotions, and on empirical issues related to the death penalty. As I get older, I spend more of my time advising graduate students on their work, some of which is closely related to mine, some of which is not. They are, after all, the future of psychology.

Please list five articles or books that have had a deep influence on your thinking

1. D. T. Campbell & J. C. Stanley. *Experimental and quasi-experimental designs for research.* Rand McNally, 1966.
2. E. M. Forster. *Two cheers for democracy.* Edward Arnold & Co. 1951.
3. William James. *The principles of psychology.* Henry Holt. 1890.
4. G. E. Hutchinson. Concluding remarks. *Cold Spring Harbor Symposium on Quantitative Biology,* 1857, *22,* 415-427.
5. Erving Goffman. *The presentation of self in everyday life.* Anchor Books, 1959.

I have been deeply influenced by works of poetry and fiction too numerous to list.

What do you think are the most pressing questions that future affective science should be focusing on?

I would love to see more research on the development of emotion in infancy and childhood, as it seems to me that this research would help us to make progress on many of our most significant theoretical questions. First, we could learn more about which aspects of emotion are innate and which are learned, and so begin to understand what are the biological raw materials and how are they affected by experience and learning, including the role of culture. Second, we could learn about how language affects emotion. Third, we could better understand the relation between cognition and emotion (I realize that these questions are related). Some of this research could be informed by cross-species comparison, some by cross-cultural comparison. Joe Campos has done wonderful research on emotional development, but there are far more scholars working with adults than with children, and among developmental psychologists, there have been far more researchers studying cognition than emotion.

References

Cowan, C., Thompson, W., and Ellsworth, P.C. (1984) The effects of death qualification on jurors' predisposition to convict and on the quality of deliberation. *Law and Human Behavior, 8*, 53-79.

Ekman, P., Friesen, W. V., & Tomkins, S. (1971) Facial affect scoring technique: A first validity study. *Semiotica, 3,* 37-58.

Ellsworth, P.C. (1994a) Sense, culture, and sensibility. In S. Kitayama and H. Markus (Eds.) *Emotion and Culture: Empirical Studies of Mutual Influence*, Washington, D.C.: APA.

Ellsworth, P.C. (1994b) William James and emotion: Is a century of fame worth a century of misunderstanding? *Psychological Review*. (Centennial Issue), 101, pp. 222-229.

Ellsworth, P.C. (1994c) Levels of thought and levels of emotion. In P. Ekman and R.J. Davidson (Eds.) *The Nature of Emotion: Fundamental Questions*. New York: Oxford, pp. 192-196.

Ellsworth, P. C. (2014). Basic emotions and the rocks of New Hampshire. *Emotion Review, 6,* 21-26.

Ellsworth, P.C., Bukaty, R., Cowan, C., and Thompson, W. (1984) The death-qualified jury and the defense of insanity. *Law and Human Behavior, 8*, 81-93.

Ellsworth, P.C., & Carlsmith, J.M. (1973) Eye contact and gaze aversion in an aggressive encounter. *Journal of Personality and Social Psychology, 28*, 280-292.

Ellsworth, P.C., & Gonzalez, R. (2003) Questions and Comparisons: Methods of research in social psychology. In M. Hogg and J. Cooper (Eds.) *Sage Handbook of Social Psychology*. London: Sage, pp. 24-42.

Ellsworth, P.C., & Levy, R.J. (1969) Legislative reform of child custody adjudication: An effort to rely on social science data in formulating legal policies. *Law and Society Review, 4*, 167-233.

Fitzgerald, R., and Ellsworth, P.C. (1984) Due process vs. crime control: The impact of death qualification on jury attitudes. *Law and Human Behavior, 8*, 31-52.

Hastorf, A. H., & H. Cantril (1954). They saw a game: A case study, *Journal of Abnormal and Social Psychology, 31,* 129-134.

Lee, S. W. S., & Ellsworth, P. C. (2013) Maggots and morals: Physical disgust is to fear as moral disgust is to anger. In K. R. Scherer & J. R. J. Fontaine (Eds.) *Components of Emotional meaning: A Sourcebook.* Oxford University Press.

Mischel, W. (1968). *Personality and Assessment.* New York: Wiley.

Niiya, Y., Ellsworth, P.C., & Yamaguchi, S. (2006) Amae in Japan and the U.S. Explorations of a “culturally unique” emotion. *Emotion, 6*, 279-295.

Schachter, S., & J. E. Singer (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review, 69,* 379-399.

Smith, C.A., and Ellsworth, P.C. (1985) Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, 1985 48, 813-38.

Sommers, S., and Ellsworth, P.C. (2000) Race in the courtroom: Perceptions of guilt and dispositional attributions. *Personality and Social Psychology Bulletin, 26*, 1367-1379.

Thompson, W., Cowan, C., and Ellsworth, P.C., and Harrington, J.C. (1984) Death penalty attitudes and conviction proneness: The translation of attitudes into verdicts. *Law and Human Behavior, 8*, 95-114.

Tourangeau, R., and Ellsworth, P.C. (1979) The role of facial response in the experience of emotion. *Journal of Personality and Social Psychology, 37*, 1519-1531.

Wondra, J., & Ellsworth, P. C. (in press) An appraisal theory of empathy and vicarious emotions. *Psychological Review.*

Cases:

Apodaca et al. v. Oregon. 406 U.S. 404 (1972)

Atkins v. Virginia. 536 U.S. 304 (2002)

Brown v. Board of Education. 347 U.S. 483 (1954)

Lockhart v. McCree. 476 U.S. 162 (1986)

Roper v. Simmons. 543 U.S. 551 (2005)

Williams v. Florida. 399 U.S. 78 (1970)

Understanding the Face as a Dynamic Communication Tool

Rachael Jack, Institute of Neuroscience and Psychology, University of Glasgow

Our aim & approach

August 2015 – In our research group, we aim to understand social communication – i.e., how humans transmit and decode information to support social interactions. Our primary current focus is on emotion communication by means of facial expressions. To shed light on this, we use a multidisciplinary approach that combines vision science and psychophysics, cultural psychology, cognitive science, and 4D computer graphics. Here, I will highlight the strengths and broad potential of our approach and consider future directions. First, it is useful to step back and briefly consider what social communication is.

Social communication as a system of information transmission and decoding

Social communication is much like many other communication systems (e.g., Morse coding, pheromones, mating calls, bacterial quorum sensing) – a dynamic process of transmitting and decoding information.

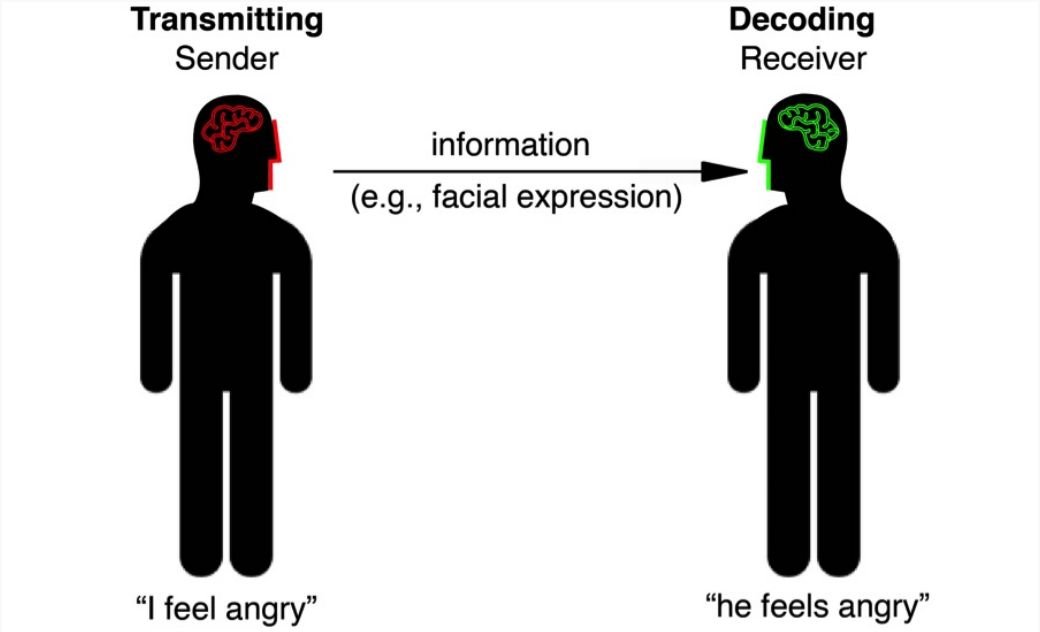


Figure 1: Communication is a dynamic system of information transmission and decoding. Figure from (Jack and Schyns 2015).

Communication is the act of sending information that affects the behavior of another individual (e.g., Dukas 1998, Shannon 2001, Scott-Phillips 2008). Although the specifics of defining communication are widely discussed (e.g., whether sender and/or receiver should benefit from the exchange), our focus is on understanding the transmission and decoding of information as shown in Figure 1. Briefly stated, the sender encodes a message ("I feel angry") into an information bearer (e.g., a facial expression) and transmits it to a receiver (e.g., a human visual system). The receiver must first detect then decode the transmitted information using prior knowledge (i.e., mental representations) to derive a meaning (e.g., see Schyns 1998). For example, if the wrinkled nose and bared teeth in a face corresponds

with the receiver's prior knowledge of 'anger,' he/she will perceive that "he/she feels angry." Therefore, understanding any system of communication requires identifying which transmitted information reliably elicits a particular perception in the receiver.

The face is a highly complex source of social information

One of the most powerful tools in social communication is the face (but see also voice and bodies, e.g., Belin, Fillion-Bilodeau et al. 2008, de Gelder 2009, Sauter, Eisner et al. 2010). As illustrated in Michael Jackson's *Black or White* music video below, the stream of changing faces vividly elicits a sequence of inferences based on the face – e.g., identity (e.g., Gauthier, Tarr et al. 1999), gender/sex (e.g., Little, Jones et al. 2008), age (e.g., Van Rijsbergen, Jaworska et al. 2014), race/ethnicity (e.g., Tanaka, Kiefer et al. 2004), sexual orientation (e.g., Rule and Ambady 2008), health (e.g., Grammer and Thornhill 1994), attractiveness (e.g., Perrett, Lee et al. 1998), emotions (e.g., Ekman 1972), personality traits (e.g., Willis and Todorov 2006), pleasure (e.g., Fernández-Dols, Carrera et al. 2011), pain (e.g., Williams 2002), social status (e.g., in pigmentocracies where skin tone determines social status, see Telles 2014), and deception (e.g., Krumhuber and Kappas 2005).

As a transmitter of information about multiple and complex social categories, the face represents a *high dimensional dynamic information space* (see also Fernandez-Dols 2013). To illustrate, the face has numerous independent muscles (Drake, Vogl et al. 2010), which can be combined to produce intricate dynamic patterns (i.e., facial expressions). Variations in facial morphology (i.e., shape and structure), color (e.g., pigmentation, see Pathak, Jimbow et al. 1976), texture (e.g., wrinkles, scarring), and facial adornments (e.g., cosmetics/painting, tattooing, piercings/jewelry, hair) each provide further rich sources of variance (see *Dimensions of Face Variance* Movie below). Therefore, identifying which segments of the high dimensional information space subtends different social judgments remains a major empirical challenge. How can we tackle this successfully?

Broadening theoretical and empirical approaches to social communication

To address the challenge of extracting socially relevant information from the face, traditional approaches primarily use theoretical knowledge and naturalistic observations to select and test small sections of the high dimensional information space. Most notably, based on Darwin's groundbreaking theory of the biological origins of facial expressions (Darwin 1999/1872), Ekman's pioneering work proposed that a specific set of facial expressions, each characterized by a pattern of individual face movements called Action Units (AUs, see Ekman and Friesen 1978 for all AU patterns), communicates six basic emotions ('happy,' 'surprise,' 'fear,' 'disgust,' 'anger' and 'sad') across all cultures. In several cross-cultural recognition studies (e.g., Ekman, Friesen et al. 1987, Matsumoto and Ekman 1989, Biehl, Matsumoto et al. 1997), these specific AU patterns elicited above chance recognition performance (e.g., >16.7 % accuracy in a standard 6-alternative forced choice task, i.e., 1/6 = chance) across different cultures. Consequently, these AU patterns became widely acknowledged as universal (see Izard 1994 for a review) and the gold standard in research across broad fields.

These classic works remain undoubtedly influential, inspiring an era of cross-cultural recognition studies that have dominated the field for over 40 years. However, such an approach casts a relatively narrow light on understanding which facial expressions are universal and which are culture-specific (see also Russell 1994, Elfenbein and Ambady 2002, Jack 2013, Nelson and Russell 2013). Specifically, using chance performance (i.e., >16.7% accuracy in a standard 6-alternative forced choice task) as a minimal threshold criterion to demonstrate universality potentially masks significant cultural differences in recognition accuracy, because any variance in performance would be considered as equally universal. Furthermore, most recognition studies have focused on a limited (and limiting) set of basic emotions, neglecting many other emotion categories in the process (e.g., delighted, anxious). Consequently, knowledge has remained restricted to a small set of static AU patterns that communicate only six emotions primarily in Western culture, disregarding a large proportion of the human population (Henrich, Heine et al. 2010).

Identifying the dynamic AU patterns that communicate different emotions and other socially relevant categories (e.g., personality traits, other mental states etc.) requires considering the full high dimensional information space of possible

face movements. Here, we present such an approach.

Probing the 'receptive fields' of social perception using psychophysics

To identify which specific patterns of facial movements – that is, segments of the high dimensional dynamic information space – communicate emotions in a given culture, we use an approach analogous to probing the receptive fields of sensory neurons. For example, Hubel and Wiesel identified which visual information V1 cells in the primary visual cortex code by presenting variations of simple black bars differing in orientation, length, direction of movement and so on, and measuring which neurons fire when presented with specific stimulus features (Hubel and Wiesel 1959). Similarly, we probe the 'receptive fields' of social perception by presenting specific dynamic AU patterns and measuring the receiver's perceptual categorization responses. In other words, we use the receiver much like a metal detector to identify, in the high dimensional information space, the specific dynamic AU patterns associated with a given perceptual category (e.g., 'happy') in a given culture. Such an approach is fundamental to psychophysics – a field that aims to measure the relationship between objectively measurable information in the external environment (i.e., physical stimuli such as dynamic AU patterns) and its interpretation by an observer (i.e., subjective perception).

To illustrate, suppose that we aim to identify the facial movements that communicate the six classic emotions – 'happy,' 'surprise,' 'fear,' 'disgust,' 'anger' and 'sad' – in an unknown culture such as the Sentinelese people of the Andaman Islands situated in the Bay of Bengal. With no *a priori* knowledge of these facial expressions, we could select AU patterns agnostically – i.e., create random facial expressions – and ask members of that culture to select those that accurately represent each of the six emotions. Figure 2 illustrates our method using an example trial.

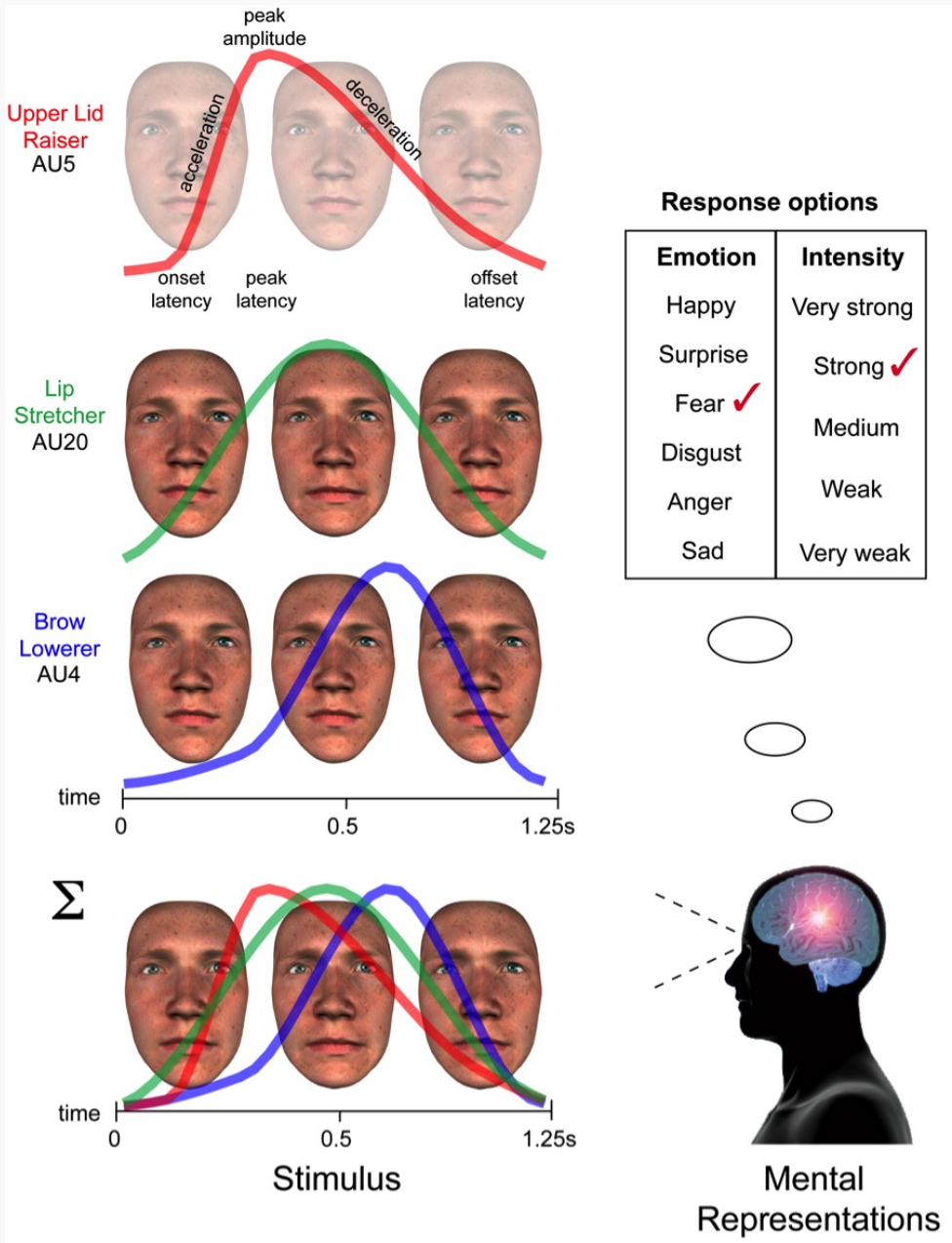


Figure 2: Psychophysically probing the receptive fields of social perception. On each experimental trial, a facial expression generator produces a random facial expression. The naïve receiver categorizes the stimulus as meaningful (e.g. fear of strong intensity) if the random facial movements form a pattern that matches their stored representation of that facial expression.

On each experimental trial, a dynamic facial expression computer graphics platform – the Generative Face Grammar (GFG, Yu, Garrod et al. 2012) – randomly samples a subset of AUs from a core set of 42 AUs (e.g., in Figure 2 three AUs are selected: Upper Lid Raiser – AU5 color-coded in red, Lip Stretcher – AU20 in green, and Brow Lowerer – AU4 in blue). The GFG then ascribes a random movement to each AU by selecting random values for each of six temporal parameters – onset latency, acceleration, peak latency, peak amplitude, deceleration and offset latency (see illustration in top row, and color-coded curves representing each AUs activation over time). The dynamic AUs are then combined to produce a photo-realistic random facial movement, illustrated here with three snapshots across time (see also *Stimulus Generation* movie below).

The naïve receiver from the Sentinelese culture categorizes the stimulus according to one of the six classic emotions and rates the intensity of the emotion perceived (here, ‘fear of strong intensity’) if the random face movements form a

pattern that correlates with their mental representation (i.e., perceptual expectation) of that facial expression. Otherwise, the receiver selects 'other' if none of the response options accurately describe the stimulus. Over many such trials, we therefore obtain a measure of the relationship between segments of the high dimensional information space (i.e., dynamic AU patterns) and the receiver's perceptual categorization response (i.e., the six classic emotions at different levels of intensity). Statistical analyses of these relationships using a method called 'reverse correlation' (Ahumada and Lovell 1971) can reveal the specific dynamic facial expression patterns that reliably communicate these emotions in this culture. Thus, we can derive the psychophysical laws of subjective high-level constructs (e.g., emotion categories) as they relate to the objectively measurable physical aspects of the face.

Doing so in different cultures (e.g., Western and East Asian, different socio-economic classes, or age groups) can then reveal whether dynamic facial expressions are similar or different across cultures, and if so, how. For example, although the six classic facial expressions of emotion have largely been considered universal, differences in recognition accuracy across cultures, and proposed culture-specific accents/dialects (e.g., Labarre 1947, Marsh, Elfenbein et al. 2003, Elfenbein, Beaupre et al. 2007) call into question the universality thesis (see Russell 1994 for reviews, Elfenbein and Ambady 2002). Additionally, empirical knowledge of facial expressions of emotion across cultures is generally limited to static and typically posed displays (e.g., Ekman and Friesen 1975, Ekman and Friesen 1976, Matsumoto and Ekman 1988, Elfenbein, Beaupre et al. 2007) that are recognized primarily in Western culture (e.g., Matsumoto and Ekman 1989, Matsumoto 1992, Moriguchi, Ohnishi et al. 2005, Jack, Blais et al. 2009). Using dynamic stimuli, our method can better characterize the dynamic AU patterns that communicate emotions, or indeed any socially relevant category such as personality traits (e.g., trustworthiness) or cognitive states (e.g., confusion), simply by changing the response options

Revealing cultural specificities in dynamic facial expressions of emotion

Using this approach, we have identified the specific dynamic AU patterns that communicate the six classic emotions – 'happy,' 'surprise,' 'fear,' 'disgust,' 'anger' and 'sad' – in different cultures (Western and East Asian), revealing three main cultural differences (Jack, Garrod et al. 2012). Figures 3 – 5 show the results.

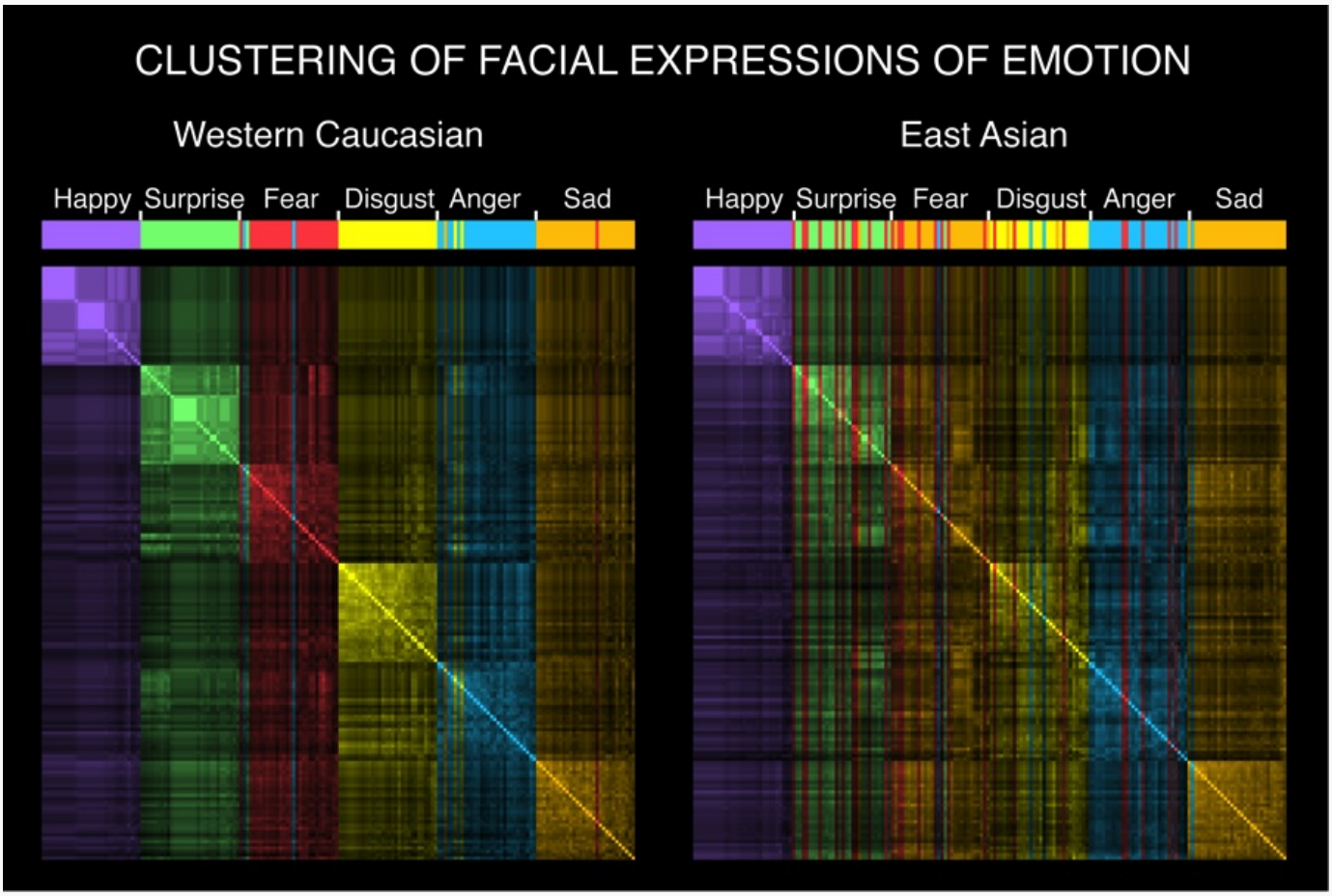


Figure 3: Clustering of Western Caucasian and East Asian facial expressions of emotion. In each panel, color-coded vertical bars show the cluster membership of each facial expression of emotion in each culture, where brighter colors indicate higher similarity between facial expressions AU patterns, darker colors indicate lower similarity. For example, in the Western Caucasian panel, the large brightly colored squares across the diagonal show that, within each emotion category, facial expression AU patterns are highly similar. Correspondingly, Western Caucasian facial expressions form six emotionally homogenous clusters (e.g., all 'happy' AU patterns comprise the same cluster, color-coded in purple). In contrast, East Asian facial expression AU patterns showed similarities between different emotion categories, as indicated by the heterogeneous color-coding across 'surprise,' 'fear,' 'disgust,' 'anger,' and 'sad,' reflecting a culture-specific departure from the view that emotion communication comprises six universally represented categories (e.g., Ekman 1992). Figure from Jack et al., 2012.

First, as shown in Figure 3, Western facial expressions formed six distinct and emotionally homogeneous clusters. For example, all Western 'happy' facial expression AU patterns are more similar to each other (i.e., high *within*-category similarity) than to other facial expressions of emotions, such as 'anger' or 'sad' (i.e., low *between*-category similarity). The uniform coloring of each cluster reflects the emotion category homogeneity of each cluster. In contrast, East Asian facial expression AU patterns showed similarities between different emotion categories, as indicated by the heterogeneous color-coding across 'surprise,' 'fear,' 'disgust' and 'anger,' reflecting a culture-specific departure from the view that emotion communication comprises six universally represented categories (e.g., Ekman 1992).

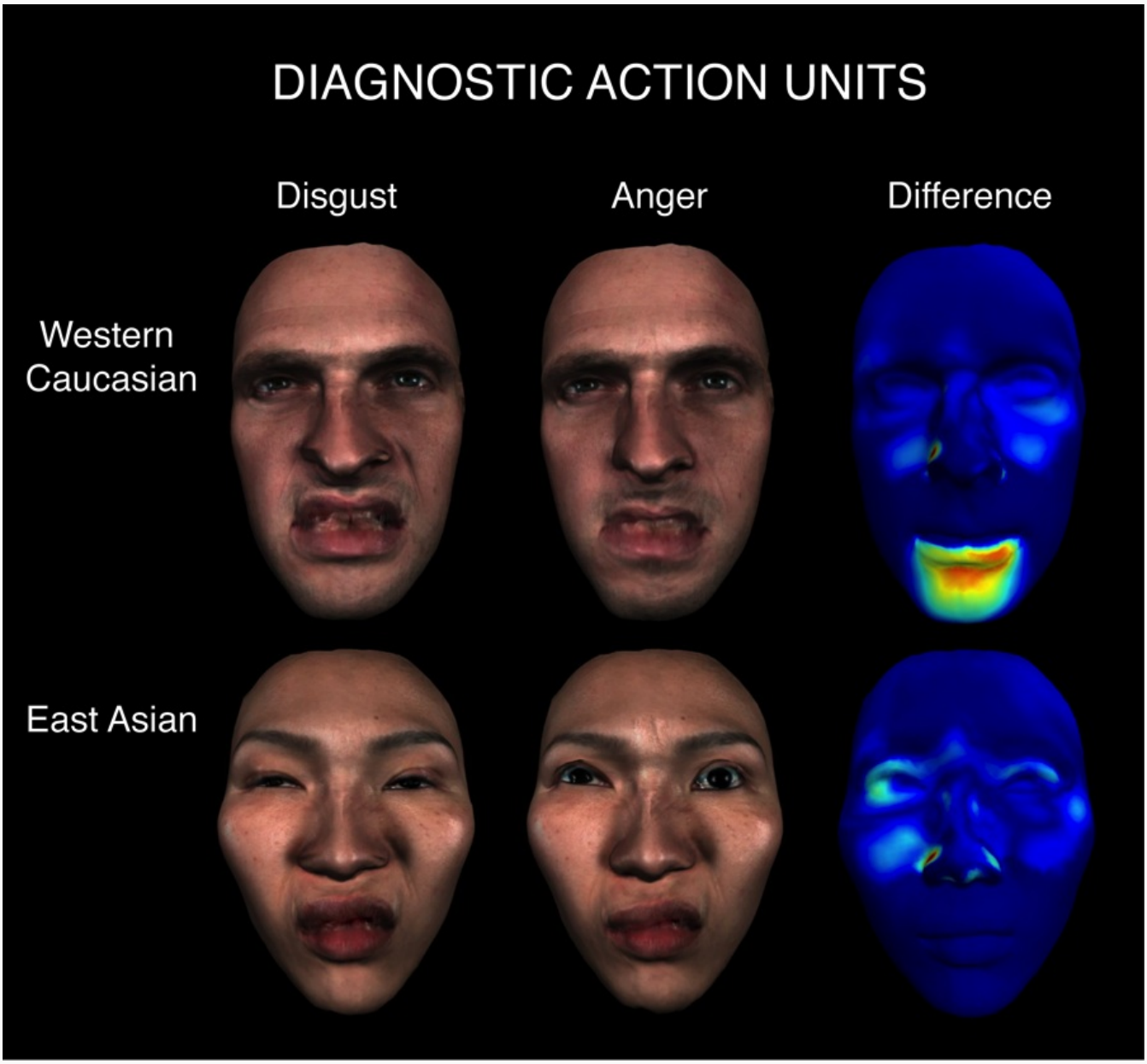


Figure 4: Cultural differences in diagnostic Action Units. Western Caucasian facial expressions of 'disgust' and 'anger' differ in the mouth region, as shown by the color-coded difference map. East Asian facial expressions of 'disgust' and 'anger' differ in the eye region. Note the narrowing of the eyes in 'disgust' compared to the eye whites in 'anger,' as reflected in the corresponding difference map. Figure from (Jack and Schyns 2015).

Second, as shown by the color-coded difference face maps in Figure 4, in Western culture facial expressions of 'disgust' and 'anger' differ according to the mouth, whereas in East Asian culture the eyes differ. For example, note the narrowing of the eyes in 'disgust' vs. the widening of the eyes in 'anger.'

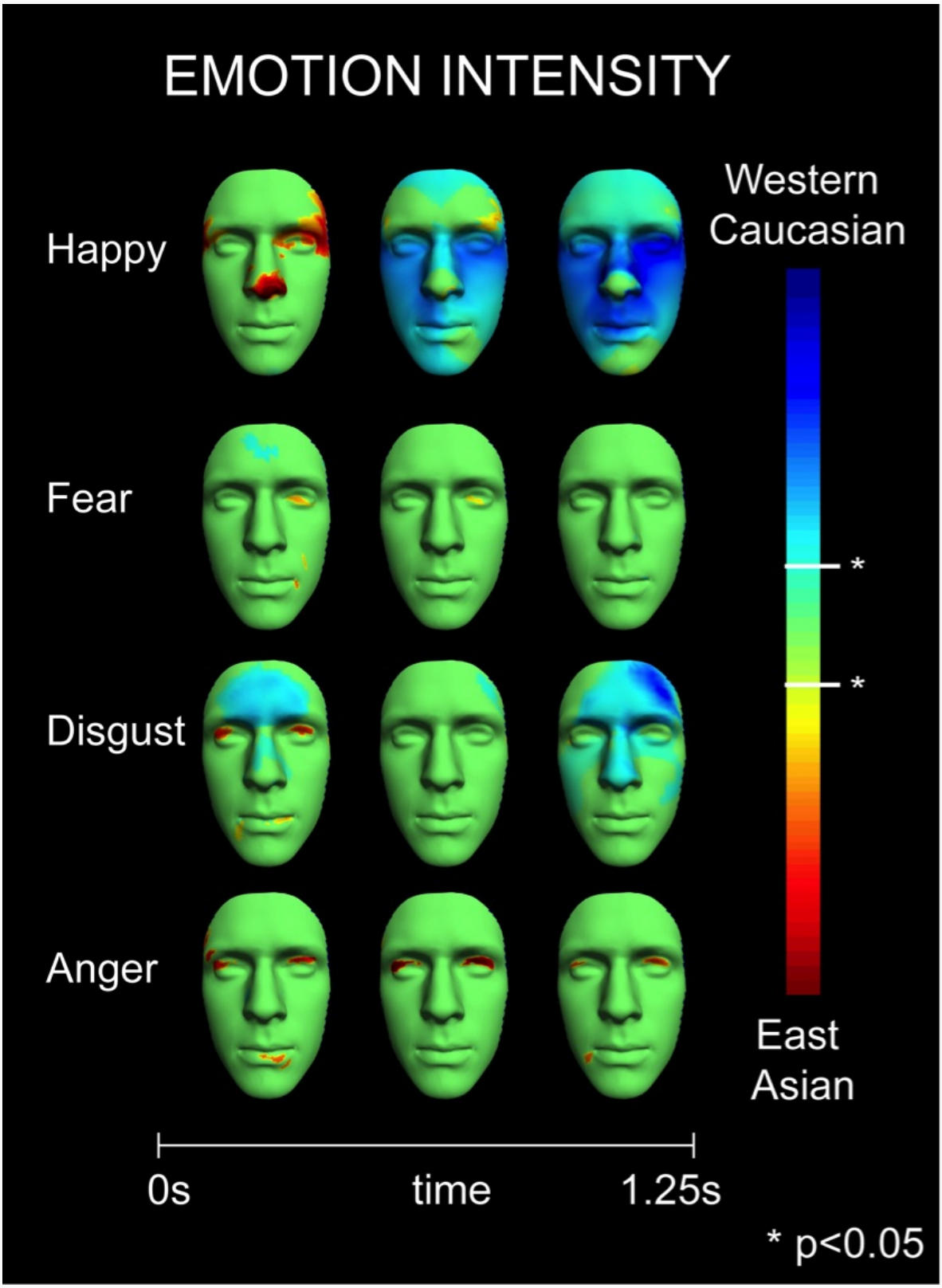


Figure 5: Cultural differences in communicating emotion intensity. For 'happy,' 'fear', 'disgust' and 'anger,' color-coded regions on each face show the face features that communicate emotional intensity across time. Blue indicates Western Caucasian specific face regions, red indicates East Asian specific face regions (values represent the t-statistic p<.05). As shown by the red color-coding, East Asian facial expressions communicate emotional intensity using early eye region activity. Figure from Jack et al., 2012.

In Figure 5, color-coded face maps – illustrated here with 'happy,' 'fear,' 'disgust,' and 'anger' – show cultural differences in the communication of emotional intensity. For example, early red colored areas show that East Asian facial expressions use the eye region to convey emotional intensity – a finding that is mirrored by East Asian emoticons

where (^.^) represents happy and (>.<) represents angry (see also Yuki, Maddux et al. 2007). Here, by mapping the relationship between dynamic AU patterns and the perception of the six classic emotions in different cultures, we precisely characterized cultural specificities in facial expressions of emotion, questioning and refining the assumption of universality.

Beyond the classic six: complex emotions, personality traits and mental states

Of course, our method can be used to identify the dynamic facial expressions that communicate virtually any social category. For example, extending beyond classic emotions, we have used our method to identify, in Western Caucasian and East Asian cultures, dynamic facial expressions of a much broader spectrum of emotions such as 'pride,' 'shame,' 'excited,' 'amazed,' 'anxious,' and 'grief' (Sun, Garrod et al. 2013), providing a richer characterization of emotion communication within and across cultures. Similarly, we have revealed intricacies in the transmission of facial movements over time. Early biologically based face movements such as eye widening and nose wrinkling (Susskind, Lee et al. 2008) are common to both 'fear' and 'surprise,' and 'disgust' and 'anger,' respectively, which supports the discrimination of only four emotion categories – 'happy,' 'sad,' 'fear'/'surprise,' 'disgust'/'anger.' Later in the signalling dynamics, diagnostic face movements such as eyebrow raising or upper lip raising support the discrimination of all six emotion categories (Jack, Garrod et al. 2014). We have also characterized dynamic facial expressions communicating personality traits – attractiveness, trustworthiness and dominance – and shown that such facial expressions, when displayed by specific face morphologies, significantly changes the social perception derived from the face.

For example, the receiver's social perception of a unexpressive face morphology can transform from highly untrustworthy to highly trustworthy when the face displays a trustworthy facial expression (Gill, Garrod et al. 2014). Finally, by identifying the dynamic facial expressions communicating the mental states of 'thinking,' 'interested,' 'bored' and 'confused' in different cultures – a valuable skill during any social exchange – we revealed the precise face information sources that produce cross-cultural miscommunication and support mutual understanding. Specifically, whereas 'interested' and 'bored' are recognized across cultures due to similar AU patterns, 'confused' shows cultural specific AU patterns that significantly impacts cross-cultural communication (Chen in press).

Conclusions and future work

Our approach uses psychophysics to agnostically select segments of the high dimensional dynamic information space of the face and measure the receiver's perceptual social categorization responses. Thus, we derive the psychophysical laws of social perception. The novelty and strength of our approach is that, rather than using subjective assumptions to select and test a small set of AU patterns, we ask individuals from a given culture to select from a wide array which facial expressions accurately communicate different emotions, or other socially relevant categories, in their culture. By using a data-driven approach, we can objectively and precisely characterize how the face – a highly complex source of social information – dynamically communicates a broad range of social categories in any culture. Our next goal is to extend our method to two other relevant dimensions of the face – complexion and morphology – to understand how each individually and in combination contributes to the perception of social categories in different cultures. We anticipate that our data-driven results will contribute to the development of existing theories of social and facial communication, and generate new conceptual advances, thereby both nurturing and benefitting from a symbiotic theory-data relationship.

Acknowledgements

Our research is funded by The Economic and Social Research Council and Medical Research Council (United Kingdom; ESRC/MRC-060-25-0010; ES/K001973/1; ES/K00607X/1), and British Academy (SG113332).

References

Ahumada, A. and J. Lovell (1971). "Stimulus features in signal detection." Journal of the Acoustical Society of America **49**(6, Pt. 2): 1751-1756.

Belin, P., S. Fillion-Bilodeau and F. Gosselin (2008). “The Montreal Affective Voices: a validated set of nonverbal affect bursts for research on auditory affective processing.” Behavior research methods **40**(2): 531-539.

Biehl, M., D. Matsumoto, P. Ekman, V. Hearn, K. Heider, T. Kudoh and V. Ton (1997). “Matsumoto and Ekman’s Japanese and Caucasian Facial Expressions of Emotion (JACFEE): Reliability Data and Cross-National Differences.” Journal of Nonverbal Behavior **21**(1): 3-21.

Chen, C., Garrod, O.G.B., Schyns, P.G., Jack, R.E. (in press). “The face is the mirror of the cultural mind.” Journal of vision.

Darwin, C. (1999/1872). The Expression of the Emotions in Man and Animals. London, Fontana Press.

de Gelder, B. (2009). “Why bodies? Twelve reasons for including bodily expressions in affective neuroscience.” Philosophical Transactions of the Royal Society B: Biological Sciences **364**(1535): 3475-3484.

Drake, R. L., A. Vogl and A. W. Mitchell (2010). Gray’s anatomy for students, Philadelphia, Churchill Livingstone, Elsevier.

Dukas, R. (1998). Cognitive ecology: the evolutionary ecology of information processing and decision making, University of Chicago Press.

Ekman, P. (1972). Universals and cultural differences in facial expressions of emotion. Nebraska Symposium on Motivation. J. Cole, University of Nebraska Press.

Ekman, P. (1992). An argument for basic emotions. Hove, ROYAUME-UNI, Psychology Press.

Ekman, P. and W. Friesen (1978). Facial Action Coding System: A Technique for the Measurement of Facial Movement, Consulting Psychologists Press.

Ekman, P. and W. V. Friesen (1975). Unmasking the face: a guide to recognizing emotions from facial clues. Englewood Cliffs, Prentice-Hall.

Ekman, P. and W. V. Friesen (1976). Pictures of Facial Affect. Palo Alto, CA.

Ekman, P., W. V. Friesen, M. O’Sullivan, A. Chan, I. Diacoyanni-Tarlatzis, K. Heider, R. Krause, W. A. LeCompte, T. Pitcairn, P. E. Ricci-Bitti and et al. (1987). “Universals and cultural differences in the judgments of facial expressions of emotion.” Journal of Personality and Social Psychology **53**(4): 712-717.

Elfenbein and N. Ambady (2002). “Is there an in-group advantage in emotion recognition?” Psychological Bulletin **128**(2): 243-249.

Elfenbein, H. A. and N. Ambady (2002). “On the universality and cultural specificity of emotion recognition: A meta-analysis.” Psychological Bulletin **128**(2): 203-235.

Elfenbein, H. A., M. Beaupre, M. Levesque and U. Hess (2007). “Toward a dialect theory: cultural differences in the expression and recognition of posed facial expressions.” Emotion **7**(1): 131-146.

Fernández-Dols, J.-M., P. Carrera and C. Crivelli (2011). “Facial behavior while experiencing sexual excitement.” Journal of Nonverbal Behavior **35**(1): 63-71.

Fernandez-Dols, J. M. (2013). “Advances in the Study of Facial Expression: An Introduction to the Special Section.” Emotion Review **5**(1): 3-7.

Gauthier, I., M. J. Tarr, A. W. Anderson, P. Skudlarski and J. C. Gore (1999). “Activation of the middle fusiform ‘face area’ increases with expertise in recognizing novel objects.” Nat Neurosci **2**(6): 568-573.

Gill, D., O. G. Garrod, R. E. Jack and P. G. Schyns (2014). “Facial movements strategically camouflage involuntary social signals of face morphology.” Psychol Sci **25**(5): 1079-1086.

Gill, D., O. G. Garrod, R. E. Jack and P. G. Schyns (2014). “Facial movements strategically camouflage involuntary social signals of face morphology.” Psychological science **25**(5): 1079-1086.

Grammer, K. and R. Thornhill (1994). “Human (Homo sapiens) facial attractiveness and sexual selection: The role of symmetry and averageness.” Journal of Comparative Psychology **108**(3): 233-242.

Henrich, J., S. Heine and A. Norenzayan (2010). “The weirdest people in the world?” Behavioral and Brain Sciences **33**(2-3): 61-83.

Hubel, D. and T. N. Wiesel (1959). “Receptive fields of single neurons in the cat’s striate visual cortex.” J. Phys **148**: 574-591.

Izard, C. E. (1994). “Innate and universal facial expressions: evidence from developmental and cross-cultural research.” Psychol Bull **115**(2): 288-299.

Jack, R. E. (2013). “Culture and facial expressions of emotion.” Visual Cognition(ahead-of-print): 1-39.

Jack, R. E., C. Blais, C. Scheepers, P. G. Schyns and R. Caldara (2009). “Cultural Confusions Show that Facial Expressions Are Not Universal.” Current Biology **19**(18): 1543-1548.

Jack, R. E., O. G. Garrod and P. G. Schyns (2014). “Dynamic Facial Expressions of Emotion Transmit an Evolving Hierarchy of Signals over Time.” Curr Biol **24**(2): 187-192.

Jack, R. E., O. G. Garrod, H. Yu, R. Caldara and P. G. Schyns (2012). “Facial expressions of emotion are not culturally universal.” Proc Natl Acad Sci U S A **109**(19): 7241-7244.

Jack, R. E. and P. G. Schyns (2015). “The Human Face as a Dynamic Tool for Social Communication.” Current Biology **25**(14): R621-R634.

Krumhuber, E. and A. Kappas (2005). “Moving Smiles: The Role of Dynamic Components for the Perception of the Genuineness of Smiles.” Journal of Nonverbal Behavior **29**(1): 3-24.

Labarre, W. (1947). “THE CULTURAL BASIS OF EMOTIONS AND GESTURES.” Journal of Personality **16**(1): 49.

Little, A. C., B. C. Jones, C. Waitt, B. P. Tiddeman, D. R. Feinberg, D. I. Perrett, C. L. Apicella and F. W. Marlowe (2008). “Symmetry is related to sexual dimorphism in faces: data across culture and species.” PLoS One **3**(5): e2106.

Marsh, A. A., H. A. Elfenbein and N. Ambady (2003). “Nonverbal “accents”: cultural differences in facial expressions of emotion.” Psychological Science **14**(4): 373-376.

Matsumoto, D. (1992). “American-Japanese Cultural Differences in the Recognition of Universal Facial Expressions.” Journal of Cross-Cultural Psychology **23**(1): 72-84.

Matsumoto, D. and P. Ekman (1988). Japanese and Caucasian Facial Expressions of Emotion (JACFEE) and Neutral Faces (JACNeuF). [Slides]: Dr. Paul Ekman, Department of Psychiatry, University of California, San Francisco, 401 Parnassus, San Francisco, CA 94143-0984.

Matsumoto, D. and P. Ekman (1989). “American-Japanese cultural differences in intensity ratings of facial expressions of emotion.” Motivation and Emotion **13**(2): 143-157.

Moriguchi, Y., T. Ohnishi, T. Kawachi, T. Mori, M. Hirakata, M. Yamada, H. Matsuda and G. Komaki (2005). “Specific brain activation in Japanese and Caucasian people to fearful faces.” Neuroreport **16**(2): 133-136.

Nelson, N. L. and J. A. Russell (2013). “Universality Revisited.” Emotion Review **5**(1): 8-15.

Pathak, M. A., K. Jimbow, G. Szabo and T. B. Fitzpatrick (1976). Sunlight and melanin pigmentation. Photochemical and photobiological reviews, Springer**:** 211-239.

Perrett, D. I., K. J. Lee, I. Penton-Voak, D. Rowland, S. Yoshikawa, D. M. Burt, S. P. Henzi, D. L. Castles and S. Akamatsu (1998). “Effects of sexual dimorphism on facial attractiveness [see comments].” Nature **394**(6696): 884-887.

Rule, N. O. and N. Ambady (2008). “Brief exposures: Male sexual orientation is accurately perceived at 50ms.” Journal of Experimental Social Psychology **44**(4): 1100-1105.

Russell, J. A. (1994). “Is there universal recognition of emotion from facial expression? A review of the cross-cultural studies.” Psychological Bulletin **115**(1): 102-141.

Sauter, D. A., F. Eisner, P. Ekman and S. K. Scott (2010). “Cross-cultural recognition of basic emotions through non-verbal emotional vocalizations.” Proc Natl Acad Sci U S A **107**(6): 2408-2412.

Schyns, P. G. (1998). “Diagnostic recognition: task constraints, object information, and their interactions.” Cognition **67**(1-2): 147-179.

Scott-Phillips, T. C. (2008). “Defining biological communication.” J Evol Biol **21**(2): 387-395.

Shannon, C. E. (2001). “A mathematical theory of communication.” SIGMOBILE Mob. Comput. Commun. Rev. **5**(1): 3-55.

Sun, W., O. G. B. Garrod, P. G. Schyns and R. E. Jack (2013). Dynamic mental models of culture-specific emotions. Vision Sciences Society, Florida, USA.

Susskind, J. M., D. H. Lee, A. Cusi, R. Feiman, W. Grabski and A. K. Anderson (2008). “Expressing fear enhances sensory acquisition.” Nat Neurosci **11**(7): 843-850.

Tanaka, J. W., M. Kiefer and C. M. Bukach (2004). “A holistic account of the own-race effect in face recognition: evidence from a cross-cultural study.” Cognition **93**(1): B1-9.

Telles, E. (2014). Pigmentocracies: Ethnicity, Race, and Color in Latin America, UNC Press Books.

Van Rijsbergen, N., K. Jaworska, G. A. Rousselet and P. G. Schyns (2014). “With Age Comes Representational Wisdom in Social Signals.” Current Biology.

Williams, A. C. d. C. (2002). “Facial expression of pain, empathy, evolution, and social learning.” Behavioral and brain sciences **25**(04): 475-480.

Willis, J. and A. Todorov (2006). “First impressions: making up your mind after a 100-ms exposure to a face.” Psychol Sci **17**(7): 592-598.

Yu, H., O. G. B. Garrod and P. G. Schyns (2012). “Perception-driven facial expression synthesis.” Computers & Graphics **36**(3): 152-162.

Yuki, M., W. W. Maddux and T. Masuda (2007). “Are the windows to the soul the same in the East and West? Cultural differences in using the eyes and mouth as cues to recognize emotions in Japan and the United States.” Journal of Experimental Social Psychology **43**(2): 303-311.

In Memoriam: Carolyn Saarni (1945-2015)

Heather Roller, Department of History, Colgate University (Carolyn's daughter)

Carolyn Ingrid Saarni, 70, passed away on June 8, 2015 surrounded by her children, extended family, and close friends. She was born in Berkeley, CA on May 13, 1945, attended Berkeley public schools and received her BA (1967), MA (1969) and PhD (1971) from the University of California, Berkeley in the field of psychology. She lived for many decades in North Berkeley, just two blocks away from her parents and childhood home. She was an early member of ISRE, and published influential work on emotion regulation and competence.

A professor for more than four decades, Carolyn taught in the Department of Educational Psychology at New York University (1971-1979) and in the Department of Counseling at Sonoma State University (1980-2013). Her work has been very influential. It stressed socialization rather than biology, long the dominant view in the field. Emphasizing the importance of studying real-life social interactions, she concluded that emotions can be manifested in many ways—gesture, posture, choice of words, and not just in the face, voice, or physiology. Other ideas central to her approach to emotion included the role of culture. Rather than seeking universal manifestations of emotion in different societies, Professor Saarni identified the many different ways that culture shapes emotion. These views were disseminated successfully to academics and the general public in her elegant, accessible writing.

Carolyn Saarni's research agenda was guided by her clinical expertise. She was well aware of the various ways in which adults can fail to acknowledge what emotions they feel or have difficulty in self-regulation. Her major contribution was to take these clinical insights and to set them in a developmental context. Children are not born with deep insight into their own emotions but they gradually become more self-aware. She studied the ways in which such insights emerge and the extent to which the child's family can nurture or hinder such understanding. In the 1980s, she coedited two volumes on this theme – *The Socialization of Emotion* (with Michael Lewis) and *Children's Understanding of Emotion* (with Paul Harris). Organizing and editing these volumes, each with an international set of contributors, laid some of the groundwork for her own book, published in 1999 by Guilford: *The Development of Emotional Competence.* This book drew on research and case studies to examine the various skills that she saw as contributing to emotional well-being – including the ability to put feelings into words, to develop strategies for coping with adversity and to regulate the expression of emotion. It became, and remains, an important landmark in the burgeoning field of emotional intelligence.

The theme of emotion regulation was the focus for some of Carolyn's most influential experimental work. She created a situation that was emotionally charged but in which children would do well to hide the emotion that they actually felt. Having helped an adult experimenter by offering feedback on a new textbook, children were rewarded with an attractive gift. Later, they were asked to do the same thing again but this time they were given a drab looking toy – for example a plastic key on a ring. Children's behavior, especially their facial expression, was filmed as they unwrapped each of these gifts. In response to the first gift, most children produced a broad smile and a 'thank you'. In response to the second, many children managed to hide their true feelings – they produced a half-smile and mumbled their thanks. Not surprisingly, this simple but elegant study came to be known as 'the disappointing gift' paradigm. It showed how children's emotion regulation could be captured on film and analyzed, and it continues to serve as a paradigmatic instance of how to do careful research on the hard-to-capture subtleties of emotion regulation and its development.

Other important works include the edited book, *Lying and Deception in Everyday Life* (1993), with Michael Lewis; and the chapter on socioemotional development in the *Handbook of Child Psychology* (2006), with Joseph Campos and

Linda Camras.

Carolyn traveled throughout the world for work and for pleasure; she shared through vivid letters and photography her discoveries in Finland, Germany, Turkey, China, Japan, Spain, Italy, Portugal, Brazil and Ecuador. She was keen to explore nature in all its variety; she camped and hiked in the more remote corners of California and Hawaii, and she was renowned to her children and their cousins as the spinner of spooky tales around the campfire on family camping trips in the Trinity Alps. She was an artful and knowledgeable gardener; she retreated when she could to her backyard oasis, filled with flowers, California native plants, fruit trees, blueberry bushes, hummingbirds and her large collection of fossils and rocks. During her struggle with lymphoma, she found peace and solace sitting by the pond she had built in her garden, tending its fish and water lilies.

Carolyn is survived by her mother, Margaret W. Saarni; her children, Matthias Kusch and Heather Roller; her granddaughters, Ella and Malia Kusch and Clare Roller; her son-in-law, John Roller; her five siblings and their families; numerous cousins, nieces and nephews; and her extended family in California and Finland.

Acknowledgements

With many thanks to Paul Harris, Joseph Campos, and Michael Lewis for their comments on Carolyn's contributions to the field.

In Memoriam: Nico Frijda (1927-2015)

Batja Mesquita, Department of Psychology, University of Leuven[1]

Nico Frijda, one of the co-founders of the International Society for Research on Emotions, passed away after a heart attack on April 11, 2015. He is remembered as a principal driving force of modern research on emotions. Nico Frijda was a Professor of Psychology at the University of Amsterdam (1965 – 1992), a member of the Dutch Royal Academy of Sciences, and a member of the American Academy of Arts and Sciences. He is survived by his wife Roos, and four children: Merlijn, Michael, Miranda, and David, to whom he dedicated his books. Nico is missed by many friends and colleagues. I thank Keith Oatley for his feedback on an earlier version of this manuscript

Bold and Subtle

For over 35 years, Nico was my mentor and one of my best friends. He was a wonderful person, full of humor, compassion, and wisdom. His academic legacy is vast and impressive. It is impossible to do full justice to either the scientist or the person of Nico, but I will describe both with two adjectives that, combined, go a long way towards characterizing him: bold and subtle. These adjectives illustrate Nico's uniqueness, complexity, and refinement.

Nico's Ideas

From the very beginning of Nico's career, as early as his dissertation in the 1950s, Nico's model of emotions (published as Frijda, 1956), departed from the traditional view on emotions In this early model, Nico explained facial expressions as initial implementations of action readiness. Facial expressions do not correspond in a one-to-one fashion with emotions as we know them (anger, sadness, happiness, etc.), but rather with modes of action readiness. Nico proposed that these modes are beginnings of emotional engagements with the world. They include tensing the muscles in preparation to attack, opening the eyes in order to take in any information that might present itself, and so on. This explanation is more potent than the idea that facial expressions are linked to emotions as we know them, because it renders some patterns of confusion in emotion labeling understandable. Taking action readiness rather than emotions as the basic unit of analysis was a bold step.

Boldness and innovation characterize Nico's other work as well. Nico's 1986 book *The Emotions* expanded the idea that emotions are, at their core, engagements with the world. These engagements are functional, not just for the survival of the species, but functional to the individual's needs and concerns. This book appeared at a time when the scientific community was receptive to the idea that emotions are purposeful, but Nico's model was unique in several ways. First, Nico proposed that emotions *are* modes of action readiness; that is, they are first, and foremost, engagements with the world. Appraisals are orientations towards the type of engagement called for. In his last book *The Laws of Emotion* which appeared in 2007, Nico explains even more clearly that appraisals, too, are in the service of action. They are perceptions of situational affordances: What does this situation invite me to do? What are the situational terms of engagement? Second, Nico suggested that appraisal and action readiness constitute the emotional experience, rather than being the antecedents and consequences of emotion. I doubt that many understood the fundamenta break Nico made with approaches that considered emotional feelings unanalyzable. In Nico's view, emotions were to be analyzed in terms of the immediate functions they fulfilled in our relationships with the environment, most especially with the social environment.

Thus, Nico's view that emotions *are* forms of action readiness, casts new light on the contents of experience, the role of appraisal, the origins of facial expression and the recognition thereof, and it is also consistent with the view that

autonomic changes are to be understood as the physical preparation needed for action rather than emotional signatures.

In sum, Nico modeled emotions as forms of relationship between an individual and the environment, rather than merely as inner feelings accompanied by bodily changes. This was and is a provocative view that has been generative of research. Bold as this view may be, it does not easily fall on either side of the well-known controversies of the field. It is subtle. Yes, the affordances of the situations can be construed, but emotions are not social constructions. In fact, according to Nico –and here Nico and I disagreed—some of the most basic emotions are hardwired in the brain (Frijda & Parrott, 2011). The readiness to escape, attack, and freeze *constitute* the core of emotions, and they are hardwired—Nico speaking. Then again, emotions are not acts, they are motivations to act: Motivations that we infer from the wide range of cognitive and instrumental acts that we observe in people who are emotional. Action readiness is real, but not to be found as a module in the brain that will light up once the skull is skillfully made transparent. More subtly, it is a functional reality, not a geographical reality; and of efforts to demonstrate the latter Nico has been critical. Bold is Nico's functional view, but subtle is the fact that he does not equate functionality with an evolutionary derivation. Evolutionary explanations, in his view, are often "too easy," and thus not subtle enough.

Nico as a Mentor

Among students at the University of Amsterdam, Nico had the reputation of being bold, not always in the fully positive sense of the word. Other students had warned me against "Professor Frijda", who was known to be sharp and critical, not easy to please, occasionally authoritarian, though the most visionary of the professors. A man to be aware of and so, as student representative at the time, I was.

Very soon I came to know him as much more than the visionary, gruff person he was made out to be. Nico was the only professor who, ignoring protocol, called me "sweetheart" in the middle of a serious meeting ("I did not hear you, sweetheart, what did you say?"). Moreover, Nico unlike many of his colleagues could readily be challenged to explain his opinion or vision. And while it is true that he has always been *more* prepared to be right than wrong, he has also always been willing to admit being "less right," and he has a sense of humor about it. He was subtle.

In the 15 years that Nico officially was my mentor, I benefited from the boldness as well as the subtlety. Nico had a strong presence, overwhelmingly so to a graduate student like me sometimes, but then he readily was able to take on another perspective (my perspective, that is). We disagreed, and I accused him of being abrasive and authoritarian indeed, but our disagreements tended to end in laughter and mutual understanding.

I also greatly benefited from Nico's great insights on all kinds of theoretical challenges. The division of roles between us was pretty clear for many years: I generated problems, he found their solutions. For the longest time—much longer than any of my colleagues have experienced with their advisors— I found Nico's solutions to be far better than any idea that I had heard or read. And even when I no longer agreed with *all* of Nico's answers anymore, he remained one of the people with whom it was most intellectually stimulating, and most deliciously upsetting, to argue.

I remember asking Nico, about 25 years ago, who solved *his* puzzles, and if it was lonely at the top. He answered there were very famous people much smarter than him, and that being where he was gave him access to these people. I have yet to meet these famous people far smarter than him. Even after so many years, Nico remained one of the boldest, and yet most subtle intellects in the field.

Nico as My Friend

I learned more from Nico than the tricks of the trade alone. Nico was a great source of personal inspiration on life matters as well. And here too it is the combination of boldness and subtlety that describes him best. Of course, Nico was a great mind, a great friend, and so forth. Of course, many of his emotions and acts were based on well-conceived goals and aspirations for himself, his environment, science, and the world as a whole. But the greatness I admire most is his clear acceptance of responsibility for his own demeanor, his own emotions, and his own acts, even if they were less than perfect. I have been inspired by his acceptance that not all desire is noble, not all emotions are

desirable, and not all acts are well conceived; they are what they are. And yet, he would say, there is no reason to resign, and all the more reason to take responsibility for them, if in the full recognition that one cannot fully control them. Bold and so damned subtle…

References

Frijda, N. H. (1956). *Het begrijpen van gelaatsexpressies*. (The understanding of facial expressions). Amsterdam: Van Oorschot.

Frijda, N. H. (1986). *The emotions*. Cambridge: Cambridge University press.

Frijda, N.H. (2007). *The laws of emotion*. Mahwah, NJ: Lawrence Erlbaum Associates.

Frijda, N. H., & Parrott, W. G. (2011). Basic emotions or ur-emotions? *Emotion Review, 3*(4), 406–415.