The Damage of Masking Children Could be Irreparable

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Public smiling in photographs probably started in the 1920s. Photography just took too long for people to hold a smile in the early years of photography. So, they sat still instead of sitting happy. Then photos got faster and people started to smile for those photos. But, probably most if not all of us suspect people actually did smile prior to 1920. We just don't have photo-documentation. And way long ago, George Washington probably didn't smile for his portrait because his ivory-tooth dentures hurt.

Dr. David Cook eloquently pondered smiles on Facebook recently saying "The stunning smile lowers perception as it raises pulse; the beautiful smile inspires as it lifts spirits. One smile owns you; one frees you. One you see; one sees you. One absorbs; one reflects. One is of the flesh; one, of the heart. The stunning smile too quickly fades; the beautiful smile shines on and on."[1]

Ya gotta love a good smile. That assumes you can recognize a smile. Can everyone tell the difference between a wry smile suggesting some deeper internal knowledge and a big grin?

Ayn Rand described faces at length in her writings. In *The Fountainhead*, Rand describes Dominique Francon: “She did not smile, but her face had the lovely serenity that can become a smile without transition.” Or, in describing what Dagny Taggart saw upon opening her eyes after crashing at Galt’s Gulch in *Atlas Shrugged*: “It was a face that had nothing to hide or to escape, a face with no fear of being seen or of seeing, so that the first thing she grasped about him was the intense perceptiveness of his eyes—he looked as if his faculty of sight were his best-loved tool and its exercise were a limitless, joyous adventure, as if his eyes imparted a superlative value to himself and to the world—to himself for his ability to see, to the world for being a place so eagerly worth seeing.” [2]

What wonderful language to describe smiles, eyes and faces and the significance of faces. Even without the language skills to describe a smile to others with that mastery of imagery, can everyone identify that level of nuance in a smile or other facial expression? What does it suggest if you can’t? Are you too shy or not interested in others? Maybe you share attributes with some syndrome like Aspergers. Maybe you slide a little further up the autism spectrum scale than some of the rest of us.[3,4] Or, maybe, possibly, something interfered with specific visual face-identifying ability development.

The philosopher Emmanuel Levinas thought human relationship and responsibility to the other person both spring from insight occurring primarily in face-to-face encounters. In that face, we find another person’s vulnerabilities and receive commands to not harm. It is in the face that class distinctions fade, and from which the Word of God can emanate. It is very difficult to dispose of a person who we have seen face-to-face. In that face-to-face contact, relationship, and actually humanity, starts and is maintained. [5] The vision science expresses the same thoughts less eloquently when it notes that faces convey fundamental social cues such as social intentions using direction of gaze and emotional states in expressions.[6]

Face-identification ability is specific.[7,8,9,10] Humans have a specific face identification area of the brain, known in research as the FFA: the Fusiform Face Area.[7,8,11] The FFA is in the right hemisphere of the brain. Prior to the age of two, the two hemispheres don’t communicate through the corpus callosum as completely as they will later.[7] The left eye early on, then, provides the vast majority of the visual input to the right hemisphere. Later on communication between the hemispheres increases.

Visual neurology – all neurology – requires the correct or appropriate input to develop. Block the proper stimulus that would drive neural development of specific areas at a time of rapid neural growth, and development of the neural network involved is impaired. The FFA is no different. If the input from the left eye very early in development is impaired, as in congenital cataract, development of the FFA can be impaired.[7,8,9,10,12] Even though the cataract is removed as early as medically feasible or recommended (not the case in some third-world situations), since infant brains are actively wiring, input to the FFA can be impaired, and therefore its functions impaired.

Recognizing faces develops over time in normal humans.[9] The basics are wired in early: Newborns detect and respond to eyes-nose-mouth. That limited face schematic of the newborn develops into fairly adult face processing, if we view faces as a whole – a Gestalt – by six years of age.[13,14] That Gestalt – the gluing of individual features together into a solid whole – is different from recognizing nuance. Nuance is recognizing subtle changes in position and spacing of the disparate parts of the whole.[8,9,13,14,15,16,17,18,19]

Nuance takes time. Adult face recognition is completed sometime after 14 years of age. When are the really active periods of neural development? We don't know, other than very general statements like the changes are probably rapid early and slow down maybe in the teens.[7]

The vision science analogizes how we detect faces by describing the human face as a horizontal bar code.[20,21] So, just for the moment, imagine checking out at the grocery store with half of each bar code covered. Before losing that visual, let's look at the neurological development of the ability to detect and discriminate faces and the nuance of the wry smile.

The face discrimination timeline

Eyes, nose, mouth, maybe eyebrows and chin are wired in at birth and infants respond to that combination. At 5 months, infants can detect exaggerations in changes in face detail spacing.[22] Maybe that's why we all think we need to exaggerate our expressions in "talking" to an infant. Blocking input to the FFA with a congenital cataract up to 2 to 6 months of age range interferes with recognizing changes in spacing of facial features – so maybe the change in the corner of the mouth in smiling, but not in recognizing external facial contours. Delaying visual input by as little as 2 months results in permanent deficits.[22]

The classic way in which we describe how we see – visual acuity; 20/20, etc – is unrelated to that loss of detecting nuance, and 9 more years of development after cataract surgery doesn't fix it.[7] Being able to detect differences between pairs of faces (shown experimentally to early cataract sufferers) will continue to improve to adult levels, but maybe not the detail spacing in a single face. Differentiating face versus non-face is not affected by several years of early cataract blindness, taking just a few weeks of visual experience to develop after the cataracts are removed.[7]

Again, the very basics are wired in. Maybe not so much the nuance shown on a single face and maybe not the emotions represented by facial expression. For example, infant-cataract sufferers, having had cataracts removed appropriately, are worse at lip reading than age-matched people who did not have early cataracts, but not worse at other visual tasks tested. Higher order face processing, probably carrying nuance, only develops if right hemisphere development is initiated in early infancy.[23]

Around 6 years of age, that gluing together of parts of faces into a whole – the Gestalt – is coming to adult levels, and that is important in distinguishing individual faces. Detecting external contours and sets of features is almost at adult levels, paralleling the maturation of visual sensitivities such as contrast sensitivity and peripheral vision. But, those extra sets of features also suffer distraction from paraphernalia such as glasses and hats.[22] Different points of view, clothing and lighting influence recognition, and 6-year-olds rely on external features such as hair for recognizing faces as familiar faces. However, face perception is driven by inner facial features, especially the eyes and mouth.[13]

Rapid changes in development occur between 7 and 11 years of age; that is, the elementary school years.[14] The brain regions involved in face detection are actually smaller than in adults but are developing. General perception of spacing of details in objects is developing and at 8 years old, with unlimited time to observe, accuracy of detecting nuance is pretty good. Between 9 and 11 years old, the switch from relying on external features (face contour, hair, head shape) to relying on recognizing internal features occurs. And, recognizing spacing nuance of features is becoming more adult-like. That recognition of nuance is still not at adult levels at 14 years old, though.[22]

Fear expressed in an observed face seems to be an exception to some of this. Fearful facial expressions are thought to project more directly to the amygdala, the area of the brain at least in part responsible for detecting fearful stimuli or perhaps separating fearful from non-fearful stimuli. Historically the amygdala has been associated with the “fight or flight” reflex. The amygdala employs more coarse visual data (lower spatial frequencies than the FFA) and emotion-attached memories in determining appropriate response.[21] This perhaps suggests this fearful-expression pathway is a sort-of early warning pathway passing on perception of a fearful situation from a parent to a child; maybe, “We’re in trouble, pay attention!”

Adult expectations and injury

As an adult, the expectation is that nuance in the spacing of face features in addition to relying on processing of contours and features will provide reliable recognition of faces, including from different angles, with different lighting, and changes in some of the paraphernalia (new hair style). And recognizing the wry smile, of course.

Damage to the occipitotemporal region (the FFA) of the right hemisphere of the brain can selectively remove the ability to recognize faces. The inability to recognize faces is termed prosopagnosia. In a 20+ year-old patient, known as LG, who suffers from developmental prosopagnosia, laboratory perceptual learning therapies could not improve face detection, and only slightly improved object recognition.[24] Taken as a whole, if something interferes with development of the FFA, or if injury happens, full function in its role as the face recognition center may not be developable or may not be recoverable at our current understanding of neurological therapies.

Special cases – Autism

Autism provides a special case in looking at face recognition.[3,4] As tested at around 8 to 9 years of age, autism biases the process of recognizing faces away from holistic – whole face Gestalt – processing. Debate continues as to whether that problem with holistic face processing represents a shift in processing, or perhaps reflects less motivation to develop expertise in face detection. That reduced motivation would be from a lack of reward from social interaction.

So, which comes first? Is it a neurological bias away from normal FFA processing, or does altered ability to achieve meaningful reward in social interaction change how faces are perceived? If it is the latter, does that suggest risk in altering social interaction in children? In high-functioning autistic adults, the research is unsettled as to whether holistic face processing is slowed, or whether reaction times in a laboratory test situation are just slower.

Implications for life with public health mandates affecting children

In June, 1964, the Declaration of Helsinki was put together to address principles to be used in human experimentation. The Helsinki Declaration declared the individual right to self-determination and to make informed decisions regarding participation in research. With children, the parents are first in line for informed consent, and then children must also express assent to any research. Individual welfare must always take precedence over the interests of society (and science). [25]

In research language, the face has been described as a horizontal bar code. As with scanning at the grocery store, if that bar code is crushed together or otherwise distorted perpendicular to the bars, the poor checker will have to manually enter the numbers corresponding to the item with the bar code. What happens if half the code is missing? What happens if the majority of faces seen by a child are half-faces, faces missing the bottom half of the facial bar code?

When we surround children with mask-wearers for a year at a time, are we impairing their face barcode recognition during a period of hot neural development, thus putting full development of the FFA at risk? Does the demand for separation from others, reducing social interaction, add to the potential consequences as it might in autism? When can we be sure that we won't interfere with visual input to the face recognition visual neurology so we don't interfere with brain development? How much time with stimulus interference can we allow without consequences? Those are all questions currently without answers; we don't know. Unfortunately, the science implies that if we mess up brain development for faces, we may not currently have therapies to undo everything we've done.

The question in the development of face recognition is: What could long-term mask mandates on children do? Another way to phrase the question is, given the development of abilities to discriminate faces and nuances in faces and emotions that show in faces, based

on specific face-discrimination neurology in a specific area of the brain, what year-long (and growing) period of time do you want to take the risk of impairing by surrounding children with masked faces while limiting social interaction?

Further, are mask mandates human experimentation without opportunity for informed consent by the adults and assent by the children?

When will we know? It could be years. Should we anticipate a generation of children who display some sort of impaired face-detection ability suggestive of autism, maybe without actual autism? Perhaps. And what if the one facial detection ability that seems to survive unimpaired is the detection of fear, directly projecting to the amygdala? Do we breed a generation of children who first and foremost see fear in faces, perhaps inappropriately? We hope not.

The wry smile. That subtle twist of the corner of the mouth, perhaps with some change in the distance between eyes and brows suggesting “I get it. I know you. I understand the situation. It’s OK with me,” and maybe there’s an edge of humor. Not the belly laugh. The dry humor. The “Let me wait a moment until you get the joke” look. That look that says we’re comfortable together and enjoying each other.

Were we knowledgeable in putting neural development at risk? Much of that is unknowable since we can only speculate on what might have been. How sad it would be if even a part of a generation saw faces as Ayn Rand described hopeless people at the end of *Atlas Shrugged*: “Empty, hopeless, unfocused faces…but no one could read their meaning.”

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