

Face to Face

Prosopagnosia Research & Community



Welcome to the first edition of the *Face to Face* newsletter! Until recently, prosopagnosia was thought to be an extremely rare disorder only caused by severe brain damage such as a stroke or tumor. However, research from our lab and others has shown that prosopagnosia is relatively common (affecting around 2% of the population), often occurs in the absence of brain damage, has serious social consequences, and frequently runs in families. We are eager to learn more about this condition and to also share our knowledge with the greater community of prosopagnosics. We've put this newsletter together to keep you up-to-date about the latest prosopagnosia research, to let you know about the ongoing and future studies at our research center, and to share stories and experiences from prosopagnosics and researchers. We plan to publish newsletters twice a year, and would love to hear feedback and suggestions!

-Prosopagnosia Research Center
(Ken, Brad, Jeremy, Joe, Lucia, Garga, Laura, & Sarah)

Face Recognition: Genetic and Specific

Do face recognition abilities and disabilities run in families? If so, is that familial resemblance due to family genes or family environment? And does difficulty recognizing faces imply difficulties in other cognitive domains? We have recently published a paper in the Proceedings of the National Academy of Sciences (PNAS) that provides, respectively, the following answers to these three questions: Yes, genes, and no.

Family Connection

To probe for family resemblance in face recognition ability, we tested 164 pairs of identical twins on the Cambridge Face Memory Test (CFMT). The test measures the ability to learn six faces and then recognize them in different poses and... (cont. pg 2)



Neuroimaging Identifies Neural Differences Associated with Prosopagnosia

The lab in London has recently completed two studies that used neuroimaging to examine how the brains of people with face blindness differ from people who have normal face recognition. The studies involved three stages: behavioral testing, structural magnetic resonance imaging (MRI), and functional MRI.

In the behavioral stage, we tested 17 people with developmental prosopagnosia (DPs) and 18 comparison participants with tasks that assessed their ability to recognize facial identity, facial expressions of emotion, and objects. As expected, DPs scored very poorly with facial identity. For facial expressions and object recognition, some DPs were severely impaired but most scored in the normal range.

The participants were then scanned twice at...

(cont. pg 3)

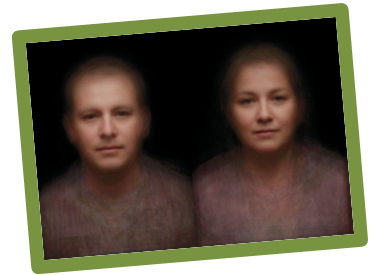
IN SEARCH OF PARTICIPANTS!

We are recruiting young adults who live in the greater Boston area, as well as local visual artists of any age. We are also looking for prosopagnosic children and prosopagnosic members from the same family, location unimportant. Interested? Please email sarahc@wjh.harvard.edu!

Face Recognition, continued from pg 1.

lighting. Identical twins share everything one can share in a family - all their genes, as well as a family environment. Therefore, if an ability or disability is familial, then identical twins should share it. This is exactly what we found.

Indeed, identical twins were more than 75% identical in face recognition ability, evidence that it really does run in families!



Genetic Influence

Given that face recognition ability could run in families either due to family genes or family environment, which causes the remarkable familial resemblance in face recognition ability? To answer this question, we compared identical to fraternal twins. If genes cause the family resemblance, then identical twins - who share twice as many genes (100%) as fraternal twins (50%) - should have face recognition abilities twice as similar to each other as fraternal twins. On the other hand, if family environment causes the family resemblance, then identical and fraternal twins - who each share a family environment - should have equally similar face recognition abilities. We found the former. Our 164 pairs of identical twins had face recognition abilities twice as similar to each other as our 125 pairs of fraternal twins, indicating that face recognition ability runs in families due to a high genetic influence.

Specific Ability

Finally, we asked whether an ability for (or difficulty) recognizing faces predicts other abilities (or difficulties). To answer this question, we tested three types of recognition ability - recognition of words, faces, and abstract art - in 3000 volunteers on our popular website www.testmybrain.org. We found that those with good face memory were only slightly more likely to have good verbal or art memory. Face recognition ability therefore appears to be a unique ability separate from other abilities.

Implications

Our discoveries that face recognition is highly familial, highly influenced by genes, and separate from other abilities improves our understanding of the nature and development of this ability. This new knowledge may enrich our understanding of prosopagnosia's causes, inform our search for treatments, and guide decisions about appropriate accommodations. For example, our results imply that certain genes contribute specifically to face recognition ability. Isolation of these genes could implicate specific molecular pathways in prosopagnosia and suggest targeted behavioral or biochemical interventions.

These findings also confirm that trouble recognizing faces frequently coexists with talents in other domains, even in other domains of visual recognition. Such specific difficulties call for equally specific interventions and accommodations. ▽ - Dr. Jeremy Wilmer

Hear Dr. Jeremy Wilmer speak about his research at

<http://www.npr.org/templates/story/story.php?storyId=123975339>

Read the full paper at <http://www.pnas.org/content/early/2010/02/12/0913053107.abstract>



What is Prosopagnosia?

People with prosopagnosia have great difficulty recognizing faces, and may fail to recognize people that they have met many times and know well - even family members and close friends. This is quite different from forgetting names (which is very common). Prosopagnosia has nothing to do with how hard one tries to remember faces. It is caused by a problem with processing visual information in the brain, which can be present at birth or develop later due to brain injury. People with prosopagnosia become very good at using clues such as context, clothes, or voice to work out who people are. So people with prosopagnosia may seem to recognise you one day, and then ignore you completely another day when they meet you unexpectedly, or you change your hairstyle. Between one and two people in every hundred may have some degree of prosopagnosia.

To download a wallet card that could help you inform others about prosopagnosia, visit www.faceblind.org/ [links](#)

How can I help someone with Prosopagnosia?

Many people get upset or angry if someone they know does not recognize them or say hello - they think that the person who does this is rude, self-obsessed, or is ignoring them. People with prosopagnosia risk doing this many times every day, often without even knowing they have done it. This can make mixing with friends and colleagues very stressful and embarrassing, causing strained relationships. You can make things much easier for someone with prosopagnosia by simply saying who you are! If you are with a group of friends and colleagues you may sometimes also be able to help out by quietly saying who other people in the group are.



This card was produced by Professor Lucy Yardley (University of Southampton), Dr. Brad Duchaine (University College London) and Professor Ken Nakayama (Harvard University).
<http://www.faceblind.org>



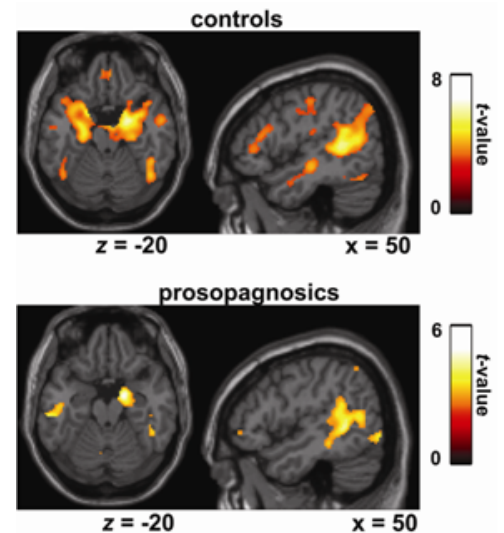
Neuroimaging, continued from pg 1.



University College London's Wellcome Centre for Functional Imaging. Scans that collected information about the structure (anatomy) of the brain were analyzed with an automated technique called voxel-based morphometry (VBM). VBM provides a means to compare grey matter volume in different brain regions between groups. This analysis showed that the DPs had less grey matter in right anterior inferior temporal lobe, middle temporal gyrus bilaterally, right middle fusiform gyrus, and right inferior temporal gyrus. These findings fit nicely with the many functional MRI studies that have shown that these temporal lobe areas respond especially strongly when people with normal face processing view faces.

Functional MRI scans reveal activity (blood flow and metabolism) in different brain areas while participants perform a certain task (e.g. face, object, scene). We investigated whether DPs show a different response to faces than control participants. Our analysis revealed that DPs showed a weaker response to faces than controls in a region called the fusiform face area in both hemispheres. The analysis also showed that DPs were more likely than comparison subjects to show no face-selective activation in the superior temporal sulcus.

We're excited by these results because they document brain areas associated with prosopagnosia, and are very grateful to the volunteers who generously provided their time and effort for these studies. However we have a long way to go to fully understand their implications and how they relate to the difficulties experienced by people with prosopagnosia. We're preparing to run more neuroimaging experiments in London and Boston. The study in London will be carried out in collaboration with Martin Eimer at Birkbeck College. Dr Eimer is a leading face researcher who uses EEG and evoked response potentials (ERPs) to investigate face processing. Whereas functional MRI scans provide good spatial information about brain regions associated with a task, ERPs provide excellent temporal precision (milliseconds) about when a brain response occurred. With ERPs we will be able to measure the precise moment when face processing in DPs deviates from normal. The lab at Harvard University is also running a structural and functional MRI study with participants who live in the Boston area. This study is in collaboration with Dr Xiaomin Yue and Dr Roger Tootell from the Athinoula A. Martinos Center at the Massachusetts General Hospital and Dr Richard Russell from Gettysburg College. We are comparing individuals with prosopagnosia with people with extraordinary face recognition abilities, also known as super-recognizers. √ - Dr. Brad Duchaine



Brain regions that were more activated by faces than cars, separately for controls and DPs. Note that there seems to be reduced activation overall for DPs. Activation in the fusiform face area was significantly higher for controls than DPs.

If you are interested in participating in these studies and if you live in the London area, please contact Brad Duchaine at brad.duchaine@gmail.com.

If you live in the Boston area, please contact Lúcia Garrido at garrido@wjh.harvard.edu.

Garrido, L., Furl, N., Draganski, B., Weiskopf, N., Stevens, J., Tan, G.C-Y., Driver, J., Dolan, R., & Duchaine, B. (2009). VBM reveals reduced gray matter volume in the temporal cortex of developmental prosopagnosics. *Brain*, 132: 3443-3455. . available at: <http://brain.oxfordjournals.org/cgi/content/abstract/132/12/3443>

Furl, N., Garrido, L., Dolan, R., Driver, J., & Duchaine, B. (in press). Fusiform gyrus face selectivity reflects facial recognition ability. *Journal of Cognitive Neuroscience*.

Researcher Spotlight:



Dr. Ken Nakayama

Ken holds a B.A. from Haverford College and a Ph.D. from UCLA. From 1971 to 1990 he was at the Smith Kettlewell Eye Research Institute in San Francisco. Since 1990 he has been at Harvard University, and he founded the Vision Science Society in 2001. He likes to put Lindt truffles in the freezer, and rides his bike to work in the Summer.



Dr. Brad Duchaine

Brad received his BA from Marquette University in 1994 and his PhD from UC-Santa Barbara in 2001. From 2001-2005, he was a postdoctoral fellow at Harvard's Vision Lab with Ken. He was a group leader in the Institute of Cognitive Neuroscience at University College London from 2005 until this summer when he moved to the Department of Psychological and Brain Sciences at Dartmouth. Brad likes to entertain his daughter, read non-fiction, and play car-combat video games.

Talking About It ~Jo Livingston

I discovered prosopagnosia in 2004 and was diagnosed at University College London, just after I retired from teaching. Although children can be face blind, I could find no teacher who had heard of it, which seemed to me a gap that needed filling.

I began in my own borough, using my work contacts and making a nuisance of myself until, after a lot of dead ends, I got a chance to speak at a meeting of Special Needs teachers. That first talk was a bit experimental but it meant I could approach the next borough saying I'd spoken on the subject to Bexley.

This method worked well as I built up more experience (I'd never done any public speaking before) and I talked my way across London until I'd spoken to more than half of the 32 boroughs. (The rest remain uninterested, in spite of multiple phone calls). In all these visits I only found a tiny handful of people who'd ever heard of the condition, usually from a background in psychology. The rest were interested, intrigued and surprisingly accepting of someone walking in off the street and presenting them with new information – special needs teachers tend to be very open-minded. Several immediately made a connection with specific children whose behaviour had been puzzling them and a common question would be 'so what can I do about it?' – of course, there are many strategies that a classroom teacher needs to understand.

I've now run out of teachers and moved to the general speakers' circuit – women's groups, retirement clubs etc. This is more like entertainment (and more fun to do) but it's still getting the word out to people who've never heard of it.

Btw, I've kept a list of anyone who realises they are face blind – the 'that's me!' moment that we all know about – and as a proportion of the 1500 people I've talked to, it's running very close to the 2% found by more scientific surveys. The one I'll always remember is a woman of 87 who was so delighted to discover an explanation for her life - her sister is also face blind. If you'd like more details on how to talk about it, do e-mail me. Jo_Livingston@hotmail.com. ▽