Psych NUws

The Newsletter of the Northeastern University Psychology Department

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From the Editor

Whew! We survived Semester Conversion!! By now, faculty and students alike are probably comfortable with the new format. Isn't it amazing to think that at this point in the year we are already half way through, instead of only one-third of the way through, as it used to be?

And before we know it, we will have springtime and graduation! If you are a senior, be sure you remember that the Psychology Department has its own Graduation Ceremony, the night before the regular graduation. Be sure you come and bring your family and loved ones! In a later Psych NUws you will read more details about this event.

I also want to remind all undergraduates about the Psychology Club and all that it offers. This year so far, several speakers have presented their work or talked about career and other opportunities; the club has social events and is developing a plan for community service as well. Dr. Quinn hopes again to take students from the club to the Eastern Psychological Association meeting. And much more. So check it out and also get a free pizza lunch!

--Prof. Hall

News of Our Grads: Michael Peabody, '02

A little over a year ago, I graduated with a BA in Psychology and had to make a decision about what to do next in my life. I was filled with exhilaration at the thought of finishing college, but filled with stress at the thought of entering the real world. I completed a TEFL certificate, which trained me to teach ESL to adults at language institutes. I spent the rest of the summer interviewing at various institutes, but did not limit myself to ESL. I sent my resume to any education job available and was frustrated because finding a job after graduation wasn't as easy as I had anticipated. After a month of searching, I wound up finding a part-time ESL job in the evenings and a day job teaching inner city adults in the Empowerment Zone, basic high school material to prepare them for the GED exam. Teaching the GED course was a great way to gain experience in between school because it allowed me to develop my own curriculum and method of teaching, while it showed me what it is like to grow up in projects and struggle to obtain a high school equivalency diploma. Although the GED program wasn't my ideal teaching situation, it was a great learning experience that has helped me to become a better teacher. Teaching in both places allowed me to compare and contrast, which environment better suited my needs and goals in life. I discovered my passion for teaching ESL and I am now enrolled in a Master's Program at Boston University.

Graduating from college is a milestone in life that had once seemed far away, but has finally arrived and you ask yourself, "…and now what?" Some of you will decide to-move back to your hometown to reacquaint yourself with the family, while others will travel, attend graduate school to not leave the comfortable world of education, which you have spent three quarters of your life, and yes, many of you have no clue as to what is the next step in life. If you feel any of these uncertainties, don't worry, it is perfectly normal and the next step will slowly, but surely reveal itself. You have been put under pressure by family, advisors, friends, society, etc. to decide what you would like to do for the rest of your life.

The advice I give to you is to listen to your heart and explore all your options. Take life one step at a time, but always maintain a long-term goal while achieving smaller, yet extremely significant goals. If you feel the need to travel, travel. You may meet someone or discover something about yourself that you have never known. If you have an insatiable appetite for education, keep feeding it; enroll in a graduate program that suits your needs and your passion.

If you are completely uncertain as to what is your passion, don't settle for a mindless job or put yourself in an atmosphere non-conducive to learning and growing. Rather, try work that will continue to build experience, your resume, and your confidence, continue to read and seek spiritual books to nurture your doubts and confusion, network with people and see what opportunities may arise. The worst thing you can do is stop learning because you will find time passes even faster than it did while attending NU and you don't want to become too comfortable in a routine that will only lead to a dead end.

Hot Research in Neuroscience

The injury suffered by Christopher Reeve, aka Superman, has brought treatment for spinal cord injuries into the forefront of basic neuroscience research and many investigations have focused on regeneration of spinal cord tissue to re-establish neural control of motor function. Miguel Nicolelis, Professor of Neurobiology at Duke University, has been instrumental in the development of a brain-machine interface system in animals that will have direct application to clinical development of neuroprosthetic devices for paralyzed people. These brain-machine interfaces hold great potential for restoring function to paralyzed people via control of neuroprosthetic limbs or free-roaming neuro robots that function via brain signals.

In previous research at Duke University Dr. Nicolelis and his colleagues developed a brain-signal recording and analysis system that deciphers brain signals from owl monkeys in order to control the movement of a robot arm. The latest research by this group shows that monkeys can learn to use only visual feedback and brain signals, (no muscle movement involved) to control a mechanical robot arm to reach and grasp objects. The researchers first implanted an array of microelectrodes into the frontal and

parietal lobes of the brains of two female rhesus macaque monkeys. The researchers chose frontal and parietal areas of the brain because they are known to be involved in producing multiple output commands to control complex muscle movement. They implanted 96 electrodes in one animal and 320 in the other animal (see September 16, 2003 Proceedings of the National Academy of Sciences article for details). The faint signals from the electrode arrays were detected and analyzed by the computer system the researchers had developed to recognize patterns of signals that represented particular movements by an animal's arm.

The researchers first recorded and analyzed the output signals from the brains as the animals were taught to use a joystick to both position a cursor over a target on a video screen and to grasp the joystick with a specified force. After the animals' initial training, the researchers made the cursor more than a simple display and now incorporating into its movement, the features, such as inertia and momentum, of a robot arm functioning in another room. While the animals' performance initially declined when the robot arm was included in the feedback loop, the animals rapidly learned to allow for these dynamics and became proficient in manipulating the robot-reflecting cursor, found the scientists. The scientists then removed the joystick, after which the monkeys continued to move their arms in mid-air to manipulate and grab the cursor to control the robot arm.

After only a few days of playing with the robot in this way, the monkey realized that it didn't need to move its arm at all. The monkeys arm muscles did not move and it was able to control the robot arm using only its brain and visual feedback. The researchers analysis of the monkey's brain signals showed that the animal learned to assimilate the robot arm into its brain as if it was its own arm. The experiments included both reaching and grasping movements derived from the same sets of electrodes. The neurons from which the researchers were recording encoded different kinds of information and surprisingly, the animal learned to time the activity of the neurons to systematically regulate different types of parameters. After using a group of neurons to move the robot to a certain point, the same cells could produce the output that the animals need to hold an object.

The analysis of the signals revealed that the brain circuitry was actively reorganizing itself to adapt. When the researchers we switched the animal from joystick control to brain control, the electrical properties of the brain cells changed immediately and when they switched the animal back to joystick control the very next day the properties changed again. The researchers concluded that the brain is very adaptable in that it can incorporate an external device into its own neuronal space as a natural extension of the body. These results on brain plasticity in mature animals are in sharp contrast to traditional views that only in early development is the brain plastic enough to allow for such adaptation. Other prominent scientists that have been instrumental in the development of this type of technology include Dr. John Chapin, of the State University of New York Health Science Center in Brooklyn; Dr. Eberhard Fetz of the University of Washington in Seattle, Dr. Jon Kaas, of Vanderbilt University in Tennessee, Dr. Idan Segevof Hebrew University in Jerusalem, and, Dr. Karen Moxon of Drexel University in Pennsylvania.

--Prof. Jackson

Size Constancy and Inconstancy: Sometimes, Size Does Matter

Some very important aspects of human perception are called the “constancies”, a name given to the tendency for many perceptual attributes to remain constant even in conditions in which the physical stimuli are changing. For example, if you rotate your hand as you hold a book, the image projected onto your retina (the light-sensitive lining on the back of your eye) changes dramatically in shape, but you do not see the book as changing shape – you see it (correctly) as a constant shape that is rotating. This is an example of shape constancy. But perhaps the best-known type of perceptual constancy is size constancy.

Consider what happens as you watch someone walk down a long hallway away from you. As they go from 20 to 40 meters away, the size of the image they make on your retina shrinks by factor of two. Despite this dramatic alteration in the proximal stimulus, you do not perceive a person shrinking – you perceive what is really happening, a person moving farther away from you. This may seem obvious – it happens so naturally and effortlessly that it is hard for us to realize that anything is going on – but in fact sophisticated brain mechanisms are needed to accomplish size constancy.

An excellent way to observe size constancy is on an airplane. Look up at the television screens hanging from the roof of the cabin, looking first at the nearest screen, then at the farthest one you can see. The objects displayed on the two screens will appear to be of the same size, even though the farther screen produces much smaller stimuli in your eye.

Constancies, like size constancy, color constancy, shape constancy, and many more, are important indications of how our perceptual systems tell us about the world, not about the raw data given by our senses. Without having constancies, we would experience the world as a 'blooming, buzzing confusion' (in the words of William James).

However, size constancy is not perfect., and it has been known for many years that it fails under some extreme conditions. Airplane travel offers another convenient example. Have you ever looked down from an airplane window and thought that the cars and people below looked tiny, perhaps 'like ants?' That is a failure of size constancy: although you can see the objects perfectly well, and indeed can even recognize them for what they are, they are distant enough that your size constancy mechanisms fail, and you no longer have the sense that they are merely farther away – they look wrong, in some sense.

Dennis Pelli and his colleagues at New York University have recently devised a clever demonstration of a failure of size constancy that does not require extreme conditions, and indeed involves a perceptual task, letter recognition, that is often thought to be particularly immune to variations in physical variables such as letter size. That is, its generally believed that if you can read a letter at all (it is big enough to see, and not so big that you can't take it all in at once), you'll recognize it no matter what the font size. Pelli's demonstration, a version of which can be viewed at www.psych.nyu.edu/pelli/icons/lettersizedemo.html, takes a little explanation.

What they do is take a set of letters such as A, B, C, and D, and blur (filter) them in a very specific way. "A" is blurred the most, "B" the next most, and so on. Then the letters are all superimposed on top of each other. What you see is a letter-like object that looks a bit like a mixture of the features of several of the letters, with one ("A", let's say) dominating. Now you walk further away from the letters, or more simply re-draw them on the computer screen at (for example) half the size. Size constancy (or as its called in this context, "scale invariance") predicts that you should see the letters in exactly the same way – "A" should still predominate.

But that's not what happens. Instead, a different letter ("B", for example) will dominate your perception at the smaller size, and indeed if the stimulus were to be halved again you might see it as a third letter ("C"), and so on.

This failure of size constancy has interesting implications for understanding reading, and of understanding perceptual constancies more generally. At least under some circumstances, letter recognition is not scale invariant, and it seems likely that more, similar demonstrations of failures of size constancy will be discovered soon.

You can find out more about perceptual constancies by taking PSY U452, Introduction to Sensation and Perception.

--Prof. Eskew

Is the Development of Minority Pride Compatible with

Social Acceptance?

Back in the 1800s, the Deaf communities centered in Henniker, New Hampshire, and in Chilmark, Massachusetts, on the island of Martha's Vineyard, presented some striking contrasts of interest to psychologists, among others.

In Henniker, there was abundant evidence that the Deaf people who were born or had gathered there had a sense of themselves as a distinct social group with its own ways and language (which they called, "the sign language.").

--They founded the first societies of the Deaf in America and the first Deaf newspapers.

--They expressed these goals: "We, Deaf-mutes, desirous of forming a society in order to promote the intellectual, social, moral, temporal and spiritual welfare of our mute community…"

--They held numerous regional meetings at whose banquets they ritually narrated great events in Deaf history.

--They raised monuments to important Deaf figures.

--Deaf people married Deaf 80% of the time despite the much greater opportunity to marry hearing people than Deaf ones.

In Chilmark, 65 percent of Deaf people married hearing people. What made all this mixed marriage on the Vineyard possible was the widespread use of sign language among hearing people on the Vineyard, and what made that possible – the spread of sign language among the hearing -- was no doubt the large number of hearing children and adults mixed in with Deaf in families.

In stark contrast to Henniker, the accounts available to us of the lives led by Deaf and hearing people in Chilmark during the same era are marked by an apparent absence of events and structures that would set Deaf people apart from hearing people. These accounts do not reveal any leader, any organization, any gathering place, any banquet or other ceremony, any monuments -- indeed anything at all that suggests that Deaf people on the Vineyard had group consciousness. Indeed, Chilmark old-timers interviewed in the 1950s could not recall who was Deaf and who hearing.

Why this contrast in group consciousness between the mainland and the Vineyard? We hypothesize that a difference in the genetic basis of the Deaf societies in the two locations is responsible for the difference in the emergence of group consciousness.

In dominant transmission of hereditary traits, such as apparently occurred in Henniker, there are likely to be Deaf children in every generation: each Deaf person receives a Deaf heritage and passes one along; each generation of his or her parents and grandparents, children and grandchildren will likely contain Deaf individuals. Marriage between relatives is not necessary for such generational depth to occur. About half of all children are expected to be Deaf.

In recessive transmission of hereditary traits, such as apparently occurred on the Vineyard, on the other hand, a Deaf person may have cousins, uncles and aunts, grandparents or more distant relatives who are Deaf, but it is less likely among the immediate family. The Deaf person may readily have hearing parents or hearing children because it is possible for his parents to have the gene and not be Deaf -- hence the name "recessive." Generational depth of deafness is less likely, and marriage among relatives is required for any to occur at all. Even if both parents have the gene, only one quarter of their children will be Deaf, and if only one parent has the gene, none of the children will be Deaf, unlike dominant transmission. In such a setting -- recessive transmission -- the Deaf person may feel a part of a rather extended family that includes hearing people, since he or she is related to so many people in the community. But that Deaf person may not feel like a crucial link in the chain of Deaf heritage from the past down to the future.

We hypothesize then that a genetic difference in the New Hampshire and Vineyard Deaf communities gave rise to a different mix of hearing and Deaf people in families. That difference in mix caused a difference in the spread of sign language, and thus a difference in marriage practices. Where there were fewer hearing people there was less language spread, less mixed marriage, and greater group consciousness.

Many minority leaders today in America advocate greater group consciousness, indeed minority pride. They also wish that mainstream society would be more accepting of them. Yet the lesson of Henniker and Chilmark seems to be that group consciousness was fostered by a relative lack of hearing people involved in the Deaf community. Group consciousness may require a "them" to build an "us."

Reference: Lane, H., Pillard, R. & French, M. Origins of the American Deaf-World: Assimilating and Differentiating Societies and their Relation to Genetic Patterning. *Sign Language Studies*, new series 1, 17-44.

--Prof. Lane

More News of Our Grads: Cheryl Carmichael, '01

When I was asked to write a brief column about where I am, and what's going on in my life, I thought, "Sure, I can do that." Then as I thought about where I am and what I've done since I left Northeastern, I realized, "Oh no, there's no way I can keep this brief!" Now, it's only been a little over 2 years since I left (I graduated in 2001), but it has been a busy few years! Since leaving Northeastern I moved to Rochester, NY. Now I know that doesn't sound too exciting, Boston to Rochester, but I moved to attend graduate school at the University of Rochester (sounding better already isn't it!). Immediately after graduating college I began a doctoral program in social psychology. I just wasn't ready to stop going to school, and I wasn't prepared to give up the autonomy that a career in research offered me. You see, I had a glimpse into this world as an undergraduate when I started working as a research assistant to Professor Judith Hall. I was able to run participants in studies, enter data, attend lab meetings, and more importantly find what I now believe to be my true calling. Going to graduate school was a decision I made near the end of my junior year at NU, so by the time I got there it was a much anticipated reward. Since I began graduate school I've taken a few classes, but more importantly I've been working several research projects, many of which I developed myself. It still amazes me that I have so much freedom in choosing what I want to work on--not many careers give you that option. My research specifically focuses on emotions and close relationships, two things I've always shown a natural curiosity for. In addition to working on projects that I choose of my own free will, every winter I attend a social-personality psychology conference in some sunny, warm location (San Antonio, Savannah, Los Angeles, Austin). As if that wasn't good enough, I was able to spend 2 weeks last summer in Boulder, CO at an intensive summer program with many other social-personality psychology graduate students, and some of the most well respect faculty in the field. Now, I realize that I may sound a bit "geeky", but I've come to embrace my geekiness, because I absolutely love what I do. Although it was an intimidating decision at the time, I couldn't be happier with what I've selected to spend my time doing. But, I have to give credit where credit's due, I owe a lot of my current happiness to the members of the psychology department at Northeastern. They provided me with invaluable experience, and opened doors for me I couldn't have opened on my own. I'm eternally grateful to those people for helping me to find my future, and I now have the opportunity to do the same for undergraduates at the University of Rochester, aiding them through the process of applying to grad school in the same way I was helped by the faculty and graduate students at NU.

The Jealous Brain: It's the Sex, Stupid!

During the past decade, interest has grown in understanding human social behavior in terms of its evolutionary context. Evolutionary psychologists, accordingly, develop and test theories that account for behaviors such as jealousy or prejudice by examining the consequences that each held for our ancestors.

One of the most trumpeted findings from this field has centered on the fact that when asked to choose which of two possible types of infidelity (i.e., sexual or emotional) would bother them more, men report that a sexual tryst by their partner would most boil their blood while women report that deep feelings of their partner for another would be the worst type of betrayal. For several reasons, my colleagues and I have doubted the veracity of this view. Here's why. Consider the following . . .

It was a lovely evening on the savannah as one of our forebears strolled toward home. As our unsuspecting progenitor turned the corner around an acacia tree, one of two possible events would mar the scene: our ancestor's mate would be found in *flagrante delicto* or engaged in an intimate conversation (or reciprocal grooming if speech had not yet adequately developed) indicative of a deep emotional attachment. Although each event would undoubtedly evoke jealousy on the part of our forebear, which event, if any, should provoke it more readily and intensely? According to the currently popular view, the answer would be: it depends whether this ancestor was male or female. If he were male, then he should react more to the instance of sexual infidelity; although fraternization of his mate with another male would be distasteful, the possibility of cuckoldry posed by her sexual liaison would be most debilitating to his genetic fitness. However, if this ancestor were female, she would, of course, not want her partner to engage in extra-dyadic sex, yet the possibility of his forming a bond with another woman, and thereby going off with her, would be much more problematic for ensuring that the couple's offspring would live to the age of sexual maturity.

In order to enhance the fitness of each sex, so the theory goes, the male and female brains were differently sculpted by the evolutionary chisel; that is, we are more likely the descendants of the ancestors who responded "correctly," which has resulted in the presence of sex-specific evolved mechanisms, or modules, that function to make us particularly sensitive to influences of the theorized type of infidelity.

This view of jealousy, though accepted by many, has also evoked considerable debate. Several exchanges between adherents and critics have occurred during the past decade. Of importance, these debates do not center on the utility of taking an evolutionary perspective to understanding emotion, but rather question the specifics of the proposed evolutionary theory of jealousy.

Unfortunately, many of these exchanges have not moved knowledge ahead, but rather continue to lead psychologists through a circular thicket. One reason for this predicament involves the quasi-experimental nature of many paradigms in evolutionary psychology. No one knows the pressures facing our ancestors with certitude; the enterprise, therefore, is akin to conducting an experiment wherein the researcher does not clearly know how the independent variables were manipulated or with what they might covary. Thus, claims of biological causality become tenuous; separating genetics from enculturation is a tricky business. This is not to say that evolutionary psychology is a flawed paradigm, but rather one requiring a greater sensitivity to issues of internal validity. A second, related reason for continued debate is that as alternative mechanisms to explain the sex difference have been offered, they have been reinterpreted, correctly or erroneously, as evolutionarily derived. A third reason is that even if one places stock in data showing cross-cultural variability in the basic sex difference, one must also admit that such variability does not preclude the existence of evolved mechanisms, but may simply represent cultural pressures shaping a universal response. As you can now surmise, this situation commonly results in each side of the debate preaching to its choir.

To our minds, this debate was not to be answered through the tactics mentioned above, but rather through a test of the evolutionary view on its own merits. Although we could not directly manipulate the proposed causal mechanisms (i.e., sex-specific evolved modules) to determine the validity of the theory, we could experimentally control the conditions under which they operated. The crux of the argument underlying evolved mechanisms is that they function as unconscious and efficient processes. That is, they do not require volitional initiation or high cognitive effort to shape behavior in a fitness-enhancing fashion (of course, the outputs of these mechanisms could be shaped by consciousness). Rather, these mechanisms

should be reliably evoked upon perception of the applicable stimulus.

This view led us to conduct two simple tests of the evolutionary view. The first involved the suspected limitation of the sex difference to a single measurement instrument: the usually employed forced-choice between the two types of infidelity. If jealousy in response to the infidelities stems from evolved mechanisms, it should result from simple presentations of the stimuli as well as from simultaneous presentations. It was not likely to be the case, after all, that our ancestors would find instances of both types of infidelity simultaneously awaiting them behind the acacia tree. Using analyses of both simple distress and more multi-faceted jealousy scales on a sample of 111, we found an interesting dissociation. When jealousy is recorded in response to each infidelity individually (regardless of the type of response format used), both men and women are most jealous of sexual infidelity. Yet, these same individuals show the usual sex difference on a forced-choice measure, with women reversing their opinions. This finding has since been replicated using a sample of approximately 22,000, thereby raising the spectre that data from the forced-choice may represent an artifact of measurement. Proof of this claim, of course, would require both an explanation of the cause of the dissociation and verification of which data pattern represents the true, gut-level response.

To satisfy these constraints, we decided to manipulate the level of cognitive processing available to participants. If the sex difference does result from evolved modules, then it should not be diminished under conditions known to enhance the functioning of efficient mental processes. Yet, if it involves effortful reasoning (as much research suggests that forced-choice response formats initiate), then the sex difference should lessen. We therefore had 121 participants complete the usual forced choice measure with one twist: half of them completed it while experiencing a cognitive load. Cognitive load is a technique that decreases one's ability to think critically. As we expected, the usual sex difference emerged in the control condition. However, under cognitive load, it disappeared. Women acted as men did; both genders selected sexual infidelity as most distressing. Had the participants selected sexual and emotional infidelity equally, one might have argued that the load manipulation completely distracted them from the task. However, this was clearly not the case; sexual infidelity emerged as the greater threat for both genders on the automatic level.

By being able to manipulate the conditions under which the sex difference occurs, we believe we have a strong understanding of the processes by which it operates. Those processes, we argue, are not consistent with any views of the functioning of evolved mechanisms. If a biological claim is to be made, it seems clear that, at a gut level, men and women are most jealous of sexual infidelity. Seems like the ancient grandmothers who seethed most at their mates' philandering may have helped their fitness after all. Where there is no sex, there is no possibility of a child to support, and with no possibility of a child, the rival female would not waste her time frolicking under the acacia tree.

--Prof. DeSteno

OPPORTUNITIES

The Speech Perception Lab needs you if American English is your native language, you have no speech or hearing disorders, and you are between 18 and 45 years of age. We pay $10/hr for one or two hour experiments, scheduled at your convenience. Call 373-4462 for details.

Psych NUws is a joint effort of the faculty, graduate and undergraduate students, and staff of the Northeastern University Psychology Department. Direct all inquiries and contributions to the Editor, Prof. Judith Hall. We especially welcome contributions from undergraduates!