

ERNI-HSF scientific report: India Morrison and Patrick Haggard

The workshop *Pleasure and Pain: Relationships in Somatosensation and Nociception* was held on 8-9 October 2012 at the Beaulieu Hotel in the New Forest, Hampshire, England. The programme was a fusion of somatosensory research on pain-related and pleasure-related neural systems, from afferent nerves to the brain. One of the goals of the workshop was to explore what these two very different aspects of somatosensory representation might have in common—whether in the form of overlapping neural systems, subjective experience, or conceptual description. What emerged was an interdisciplinary appreciation of pain and touch, and a chance to interrogate intimately the details of their underlying architecture. This interdisciplinary aspect was a unique feature of the meeting. It allowed the ideas presented to be evaluated and critiqued by specialists in complementary subfields of somatosensation research. Discussion periods were interleaved with touch-related sessions and pain-related sessions. Informal discussion was further facilitated by the fact that most delegates stayed at the workshop venue, the Beaulieu Hotel.

8th October 2012

The workshop started with an introduction by Frederique de Vignemont (Paris, France): *Pain and affective touch: between perception and emotion*. This talk provided an outline of the main conceptual challenges posed by the affective dimension of pain and touch. Several distinctions were highlighted, including that between the sensory-discriminative and affective aspects of pain and touch. The relationship between bodily sensations and emotion raises important questions for both pain and touch; for example, is the relation between the sensory and the affective components similar in affective touch and in pain?

The session continued with a talk by Jordi Serra (Barcelona, Spain) on “*Quantal*” *sensations, intraneural microstimulation, and the the problem of peripheral neural coding of nociceptor input*. This talk focused on the technique of microstimulation of peripheral nerve fibers. The term “quantal” in the title referred to a minimum degree of nerve stimulation sufficient to produce a percept.

During the discussion session that followed, debate on details of microneurography techniques and afferent fiber types was lively. One particular area of controversy concerned the properties and status of tactile C (CT) afferents and their role in touch. Serra had declared his skepticism, though CT fibers were the topic of the following two talks.

First, Johan Wessberg’s (Gothenburg, Sweden) talk *Pleasant touch: The human unmyelinated C-tactile (CT) afferent system* sketched the technique of recording from particular afferent receptors using microneurography (as distinct from microstimulation covered in Dr Serra’s talk). The bulk of the talk was devoted to discussing the properties of CT afferents and their pathways to the brain.

India Morrison’s (Gothenburg, Sweden) talk focused on atypical affective touch processing in *A human nerve growth factor beta mutation affecting thin-diameter sensory afferents and neuroanatomy*. The research presented centered on a group of cognitively normal individuals with a severe reduction in CT-afferent density as a result of a mutation on nerve growth factor beta (NGFB) gene. These CT-reduced individuals differ from controls on behavioral (psychophysics) and neural (fMRI, DTI) measures, providing preliminary evidence that

individuals with reduced CT density show functional differences suggestive of reorganization of the relevant neural pathways.

The next session on pain was preceded by discussion and lunch in the dining room of the Beaulieu Hotel.

The first speaker after lunch was Robert Coghill (Wake Forest, USA): *Evaluation of nociceptive information during the construction of a subjective experience of pain*. This talk outlined behavioral and neuroimaging evidence that the anterior insular cortex and anterior cingulate cortex interface between bottom-up and top-down information. Professor Coghill concluded that these regions are importantly involved in both the evaluation of nociceptive information as well as the tuning of nociceptive processing to reflect cognitive sets, resulting in the subjectively unique complexions of pain experience.

The philosopher David Bain (Glasgow, UK) provided a theoretical perspective on asymbolia for pain in *An evaluativist account of asymbolia*. In this talk, Dr Bain examined the “evaluativist” account in which pain asymbolia reflects pain’s unpleasant, affective, or motivating component. Instead, he proposed that it might be a symptom of a broader “care lack” in which individuals fail to consider the welfare of their own bodies in a variety of ways.

Siri Leknes’ (Oslo, Norway) talk encapsulated the themes of the meeting under the heading of “hedonic feelings”: *Investigating the neural basis of hedonic feelings*. Dr Leknes’ talk explored the neural overlap between pain and touch systems in the brain. She presented pharmacological and neuroimaging data supporting the proposition that pain and reward circuitry can be both anatomically and functionally interrelated.

After dinner, PhD students and postdocs presented their work in a well-attended poster session.

9th October 2012

The first session of the day focused on pain modulation. After breakfast and coffee, Walter Magerl (Heidelberg, Germany) started the day with *Modulation of tactile and vibration sensitivity by ongoing pain and hyperalgesia*. He presented a detailed survey of the peripheral and central mechanisms of interaction between touch and pain. A particular focus was the zone of secondary hypoaesthesia that surrounds a site where a nociceptive stimulus has been presented. The spatial principle of this interaction was used to elucidate the processes of spinal interaction between different classes of somatosensory afferents.

Fabrizio Benedetti (Turin, Italy) gave a talk entitled *Placebo and nocebo: from pain to no-pain and back to pain through verbal suggestions*. He highlighted the ubiquity and power of the placebo effect, and used this to demonstrate how perceptions generally involve a combination of afferent input and prior expectation. Discussion focussed on the extent to which placebo effects may be a cultural phenomenon, established by reasonable expectations of analgesic effects of previous interventions.

Tasha Stanton (Melbourne, Australia) and Patrick Haggard (UCL, London) both discussed the relation the neural representation and the experience of pain. Tasha Stanton’s talk (*Targeting cortical body representations in clinical pain*) described the tight coupling between pain the subjective perception of the painful body part in chronic pain patients. Changes in perceived size, and in thermal regulation of a painful body part were particularly highlighted. It was concluded that the relation between body part size and pain was bidirectional, so that therapies manipulating body perception might also modulate pain levels. Patrick Haggard discussed how the multisensory representation of the body affected the experience of pain. His talk was entitled *Pain, touch and the representation of one’s own*

body. Studies that manipulated visual information about the body, and studies that used vestibular stimulation to provide widespread activation of cortical multisensory areas were discussed.

After lunch, Giandomenico Iannetti (London, UK) discussed the importance of peripersonal space in the correlates of the “eye-blink reflex”, which is induced by stimulating the median nerve as the subject actively moves the hand towards the face. The magnitude of this reflex increases with proximity of the hand to the face, and is strongest in nearest peripersonal space. Both neuroimaging and EEG studies support the proposal that the eye-blink reflex is dynamic and sensitive to top-down factors such as expectation and artificial foreshortening of peripersonal space by a barrier. The studies presented in this talk indicate that defensive actions are facilitated in anticipation of a potential threat.

Martin Paulus (San Diego, USA) spoke about the relationship of touch and interoception in *Interoceptive dysregulation in drug addiction – evidence for attenuated processing of soft touch in adolescent and adult substance users*. Professor Paulus presented neuroimaging evidence indicating that methamphetamine substance abusers show reduced insular activity during gentle stroking stimulation compared to controls. This evidence is suggestive of an interoceptive-system deficit in which anticipation and experience of soft touch is dysregulated in both adolescents and adults with substance use disorder.

To round off the workshop, Francis McGlone gave an unscheduled ‘bonus’ talk on mechanisms of itch. He argued that the pleasurable sensations that can result from scratching an itch are mediated by cytokine-induced protein synthesis at the skin site. His talk also addressed the observation that itch is readily suggestible, like yawning, and that merely watching or thinking about itch can give rise to itch sensations.

<Program>

Monday October 8th

7.00-8.30 Breakfast

8.30-9.00 Morning coffee

9.00-9.30 Frederique de Vignemont (Paris, France)

Session: Pain (I)

9.30-10.00 Jordi Serra (Barcelona, Spain)

10.00-10.30 Discussion

10.30-11 Coffee break

Session: Touch (I)

11.00-11.30 Johan Wessberg (Gothenburg, Sweden)

11.30-12.00 India Morrison (Gothenburg, Sweden)

12.00-13.00 Discussion

13.00-14.00 Lunch

Session: Pain (II)

14.00-14.30 Robert Coghill (Wake Forest, USA)

14.30-15.00 Giandomenico Iannetti (London, UK)

15.00-15.30 Discussion

15.30-16.00 Coffee break

Session: Touch (II)

16.00-16.30 Siri Leknes (Oslo, Norway)

17.00-19.00 Poster session

19.00 Dinner

21.30 Continued poster session and drinks

Tuesday October 9th

7.00-8.30 Breakfast

8.30-9.00 Morning coffee

Session: Pain (III)

9.00-9.30 Walter Magerl (Heidelberg, Germany)

9.30-10.00 Fabrizio Benedetti (Torino, Italy)

10.00-10.30 Discussion

10.30-11 Coffee break

Session: Modulation (I)

11.00-11.30 Tasha Stanton (Sydney, Australia)

11.30-12.00 Patrick Haggard (London, UK)

12.00-13.00 Discussion

13.00-14.00 Lunch

Session: Modulation (II)

14.00-14.30 David Bain (Glasgow, UK)

14.30-15.00 Martin Paulus (San Diego, USA)

15.00-15.30 Discussion

15.30-16.00 Coffee break

19.00 Dinner

Wednesday October 10th

7.00-8.30 Breakfast

9.00-11.00 "Hidden Britain" guided tour of New Forest

<List of Speakers and Participants>
 <Registration – New Forest 2012>

Title*	Firstname	Surname	Gender	Institute	Country	Email
Professor	Stephen	Jackson	M	University of Nottingham	UK	stephen.jackson@nottingham.ac.uk
Dr	India	Morrison	F	University of Gothenburg	Sweden	india.morrison@neuro.gu.se
Dr	Martin	Paulus	M	University of California San Diego	California	mpaulus@ucsd.edu
Dr	Jordi	Serra	M	MC Mutual	UK	jserra@nsc-tec.com
Dr	David	Bain	M	University of Glasgow	UK	david.bain@glasgow.ac.uk
Professor	Fabrizio	Benedetti	M	University of Turin Medical School	Italy	fabrizio.benedetti@unito.it
Dr	Siri	Leknes	F	University of Oslo	Norway	siri.leknes@psykologi.uio.no
Professor	Johan	Wessberg	M	University of Gothenburg	Sweden	wessberg@physiol.gu.se
Professor	Patrick	Haggard	M	University College London	UK	p.haggard@ucl.ac.uk
Dr	Robert	Coghill	M	Wake Forest School of Medicine	USA	rcoghill@wakehealth.edu
Dr	Frédérique	de Vignemont	F	CNRS	France	frederique.de.vignemont@ens.fr
Professor	Walter	Magerl	M	University Heidelberg	Germany	walter.magerl@medma.uni-heidelberg.de
Dr	Giandomenico	Iannetti	M	University College London	UK	g.iannetti@ucl.ac.uk
Dr	Tasha	Stanton	F	University of South Australia & Neuroscience Research Australia	Australia	t.stanton@neura.edu.au
Ms	Soyoung	Kim	F	University of Nottingham	UK	lpusk1@nottingham.ac.uk
Mr	Craig	Bullock	M	University of Nottingham	UK	stxcb1@nottingham.ac.uk
Ms	Amelia	Draper	F	University of Nottingham	UK	lpxad3@nottingham.ac.uk
Ms	Jyothika	Kumar	F	The University of Nottingham	UK	jyothikakumaar@gmail.com
Mr	Hakan	Olausson	M		Sweden	hakan.olausson@neuro.gu.se
Professor	Tom	Ziemke	M	University of Skovde	Sweden	tom.ziemke@his.se

ssor						
Dr	Serge	Thill	M	University of Skovde	Sweden	serge.thill@his.se
Professor	Jonathan	Cole	M	University of Bournemouth	UK	jonathan@cofamily.org.uk
Dr	Andrew	Marshall	M	Salford Royal NHS Foundation Trust	England	andrew.marshall@manchester.ac.uk
Mrs	Anne	Worthington	F	University Hospital South Manchester	England	anne.worthington@ymail.com
Dr	Azanon Gracia	Elena	F	University College London	UK	eazanyon@gmail.com
Dr	Flavia	Mancini	F	UCL	UK	f.mancini@ucl.ac.uk
Dr	Rochelle	Ackerley	F	Physiology	Sweden	rochelle@physiol.gu.se
Dr	Massieh	Moayed	M	Neuroscience, Pharmacology and Physiology	UK	m.moayed@ucl.ac.uk
Mr	Dan-Mikael	Ellingsen	M	University of Gothenburg	Sweden	dan-mikael.ellingsen@neuro.gu.se
Ms	Guro Engvig	Løseth	F	University of Oslo	Norway	guro.loseth@gmail.com
Ms	Irene	Perini	F		Sweden	irene.perini@neuro.gu.se
Ms	Haike	van Stralen	F	Utrecht University	The Netherlands	h.e.vanstralen@uu.nl
Ms	Alyanne	de Haan	F	Utrecht University	Netherlands	a.m.dehaan@uu.nl
Professor	McGlone	Francis	M	Liverpool JM University	UK	f.p.mcglone@ljamu.ac.uk
Mr	Andrew	Wright	M	University of Birmingham	UK	axw998@bham.ac.uk
Mr	Kenneth	Paton	M	University of Nottingham	UK	stxkp@nottingham.ac.uk
Professor	Edward	de Haan	M	University of Amsterdam	the Netherlands	e.h.f.dehaan@uva.nl
Mrs	Lucy	Tomlinson	F	University of Manchester	UK	lucy.tomlinson-2@postgrad.manchester.ac.uk
Ms	Anouk	Keizer	F		Holland	a.keizer@uu.nl
Mrs	Aygul	Khusnullina	F	Bangor University	UK	pspaa6@bangor.ac.uk