P=0.009, n=233). But this relationship disappears when length of the longest spur is used as the independent variable (standardized regression coefficient 0.036, P=0.61, n=233). If one element of a pair of characters (a spur in this case, but it could be a tail feather) is shorter than the other because of differences in growth rate, injury or damage, then there will be an increased difference in character length and a lowered mean length which will bias any analysis towards giving a negative slope. The only rigorous approach is to use maximum length as the independent variable.

In conclusion, the index of relative asymmetry should never be used when looking for patterns of fluctuating asymmetry with character length. When measuring absolute asymmetry, the value for the longer of the two elements of a pair should be the independent variable. Any conclusions drawn from analyses not following this approach are flawed.

Matthew S. Sullivan
Department of Animal and Plant Sciences, University of Sheffield, PO Box 601, Sheffield S10 2UQ, UK
Peter A. Robertson
Nicholas A. Aebischer
The Game Conservancy Trust, Fordingbridge, Hampshire SP6 1EF, UK

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Pain pathways and plasticity

SIR — Ramachandran *et al.*[1] reported that in two patients with amputation of an upper limb, cutaneous stimulation of the lower face elicited topographically mapped referred sensations in the phantom hand. These results are analogous to earlier physiological findings by Pons *et al.*[2] in adult macaque monkeys; after deafferentation, cortical regions that initially represented the forelimbs became responsive to facial stimulation. It is unlikely that either result is due to new anatomical sprouting and Ramachandran *et al.* accordingly interpreted their own findings as the selective unmasking of pre-existing thalamocortical projections. Pons[3], however, has argued that such 'unmasking' is implausible as "anatomical studies have repeatedly demonstrated that areas of cortex representing the hand do not receive connections from regions of the brain representing the face."

Before it is concluded that the linkage is totally mysterious, we wish to draw attention to a release phenomenon that has not so far been mentioned in the current context. In 1920, Marinesco and Radovici[4] reported evidence for a direct pathway between the palm and the lower face. In patients with organic cerebral disease (often involving the frontal lobe), scraping the palm in the radial direction from the thenar eminence elicits a brisk contraction of the ipsilateral mentalis muscle. The reflex is not pathognomic of any one disease; it can be seen in neurological disorders that include motor neuron disease, stroke, Parkinson's disease and various encephalopathies[5]. The original patient of Marinesco and Radovici[4] had amyotrophic lateral sclerosis with extensive involvement of the corticobulbar tracts. Radovici[6] was the first to consider that cortical proximity of the hand and face areas was a significant factor in the genesis of the reflex. This palmomental reflex (PMR) is also reliably seen in neonates[7,8].

The clinical significance of the PMR has often been disputed as its reported incidence in normal adults ranges from 0 to 100%! In part, these figures reflect differences due to age; the incidence of the reflex rises steadily over the range 20 to 90 years[5]. These discrepancies are also due to differing modes of elicitation and observation. Thus Bracha[7] reported an incidence of 0% with mechanical stimulation, visual inspection, and the constraint that the reflex should be elicited on 10 rapidly successive trials; Caccia *et al.*[9] found an incidence of 70% with mechanical stimulation but an electromyographic (EMG) response recorded from the mentoneal muscles; Reis[10] reported a 100% incidence with electrical stimulation, sufficient to cause pain, directly over the ulnar or median nerves at the wrist and EMG responses in the relaxed mentalis muscle. The reflex disappears "with the loss of superficial pain during cuff compression of the brachial artery"[10], and with "superficial procainization of the reflexogenous zone, leaving deep pain intact"[11].

It would thus seem reasonable to explore the relationship between the anatomo-physiological substrate of the PMR and the striking neuronal plasticity documented by Ramachandran *et al.*[1]. That pain-pathways are involved both in the PMR and in modulating cortical plasticity[12,13] suggests a mechanism involving A-delta fibre and/or C-fibre afferents. The short latency component of the PMR is unlikely to involve the precentral motor strip (area 4)[11]; a "primary brainstem genesis" is proposed by Caccia *et al.*[9]. The late response has been conjectured to involve projections from the striatum to the thalamus with the seventh nerve nuclei reached through thalamocortical pathways[5,9]. The "unmasking" hypothesis proposed by Ramachandran *et al.*[1] may therefore apply at the brain-stem level implicated in the PMR.

John C. Marshall
Peter W. Halligan
Neuropsychology Unit, University Department of Clinical Neurology, The Radcliffe Infirmary, Oxford OX2 6HE, UK

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A thermostat in the tropics?

SIR — Fu *et al.*[1] conclude that there is no evidence for the cirrus thermostat mechanism proposed by us[2]. The fundamental evidence for our hypothesis is the observed negative correlation between sea-surface warming and absorbed solar radiation in the equatorial Pacific during the 1987 El Niño. Fu *et al.* analyse satellite cloud data for 1984–87, but these data do not indicate a correlation between western Pacific cloud and variations in sea-surface temperature (SST) on climatically significant spatial and temporal scales. They also do not find a "local relationship between SST and large-scale cirrus properties". The sort of evidence sought by Fu *et al.* has now been provided by two studies[3,4] based on longer-term satellite data.

Zhang[3] uses a 15-year record of outgoing longwave radiation (OLR) at the top of the atmosphere as estimated from satellite measurements. The spatial resolution of the OLR data is 2.5° (about 250 km) in latitude and longitude. The 15-year mean OLR and SST data for the tropical west Pacific (20° N to 20° S and 90° E to 180° E) reveal that "the decrease in OLR with SST>27° C is nearly linear at a rate of about 25 Wm^{-2} per °C"[4]. The rate of OLR variation with SST is within 20% of our estimate for the 1987 El Niño (see Table 1 of ref. 2). The observed relationship between long-term OLR and SST proves that clouds and/or their properties and SST