Combining touch and motion neuronal signals to compute contact in face centered coordinates

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The sensory stream in the rat vibrissa system has been shown to code two forms of sensory signals - one that reports contact of vibrissae with an object and a second that reports angular position of the vibrissae (independent work from our laboratory and E. Ahissar's laboratory). I will present recent evidence that shows that these signals are combined in primary sensory (S1) cortex in a manner that represents contact in face-centered coordinates (ongoing work by PhD student J. Curtis); simply said, some S1 neurons report where an object is in real space. I will further present the results from experiments that show how the underlying signals are modulated by reward (Ganguly & Kleinfeld PNAS 2004), as well as discuss proof-of-principal experiments that suggest a mechanism for this computation (K. Ahrens et al. PNAS 2002).