Journal Club

Moving faces

The human face portrays a myriad of information such as identity, age and sex. However, most studies published to date have explored face processing using static stimuli. Such an approach, brought about by previous limitations in the technology, seriously limits the ability to generalize any results to the real world. To investigate whether identity and sex information is perceived from moving faces, Hill and Johnston filmed male and female actors as they spoke[1]. They then applied a state-of-the-art computer-averaging technique to produce dynamic facial stimuli that were the same in every way, except for the manner in which they moved. This allowed them to investigate the role of face-based biological motion without interference from other facial cues. In a series of experiments they showed that when subjects were presented with stimuli depicting rigid head motion (where the head moved but the facial features were static), categorization of identity was significantly better than when the stimuli showed non-rigid facial motion (static head but with dynamic facial features), or when the stimuli depicted a combination of both.

They also showed that turning the dynamic face upside-down made the categorization of identity more difficult than if the stimuli were shown running backwards. However, non-rigid motion was found to improve judgments of gender more than rigid motion, and this ability was prone to a greater deficit when the excerpts were played backwards compared with inversion. The authors suggest that facial dynamics might contribute to an object-based motion-encoding system that facilitates the processing of identity from faces. However, as gender judgments require access to semantic concepts, non-rigid facial motion could activate the stored mental representations of characteristic male and female facial movements. This excellent study is the first to explore the possible cognitive processes that mediate perception of dynamic faces.

Future studies should now concentrate on the study of any additional types of information (such as age, or even attractiveness) that is perceived from the different forms of face-based motion. Furthermore, the study of facial-motion perception in psychopathological subject populations, such as patients with schizophrenia, would allow insight into their pathology as well as the intact human cognitive system.

1 Hill, H. and Johnston, A. (2001) Categorizing sex and identity from the biological motion of faces. *Curr. Biol.* 11, 880–885

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Stimulating times for TMS

It's a curse to live in interesting times if you don't like stimulating surprises. Transcranial magnetic stimulation (TMS) of the brain is an interesting technique whose time seems to have come. Many labs are actively developing TMS paradigms as tools to be used in parallel with fMRI and other methods, to explore human brain function. In a recent study, Théoret *et al.* applied TMS over the cerebellum, and claim that they can activate and disturb some components of the timing circuitry used for self-paced finger tapping[1].

TMS is used in four main ways. A single TMS pulse over a brain area induces a very brief , rapidly changing magnetic field in the cortical tissue that excites current flow, and causes a short-lasting disruption (tens of milliseconds) of normal processing in that area. Paired pulses over the same or two different areas can be used to explore facilitation, excitation or inhibition within and between neural circuits. Short, high-frequency trains of pulses (repetitive TMS) cause a longer blockade, typically several hundred milliseconds. Finally, long-lasting slow stimulation – for several minutes at a rate of 1Hz – can cause temporary depression of activity in a cortical region, which in fact outlasts the period of stimulation by several minutes.

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The last procedure is both interesting and worrying. Interesting because it allows one to study an area perturbed by TMS, at a stage where TMS is no longer applied. Worrying because it rather clearly indicates that the effect of TMS is not always as temporary as we assume. However, there is no doubt about the usefulness of TMS in exploring cerebral processing, and now it promises to offers insights into cerebellar activity. The cerebellum is thought to have a role in timing of motor tasks, and patients show reduced accuracy and increased variability in finger tapping following lateral and midline cerebellar lesions respectively. Théoret *et al.* showed that five-minute midline TMS stimulation slightly increases subsequent inter-tap intervals and significantly increases tapping variance, whereas stimulation of the ipsilateral hemispheres does not. Why they didn't find an effect of lateral stimulation is not clear. One reason might be that the cerebellum is too deep and too near the neck muscles to be easily stimulated transcranially. Despite this anatomical 'inconvenience', previous TMS studies have shown that cerebellar stimulation can disrupt eye movements[2] and modulate motor cortical activity[3], so this study adds weight to suggestions that TMS can be a useful tool to study cerebellar functions and perhaps ultimaltely its role in cognitive tasks.

1 Théoret, H. *et al.* (2001) Increased variability of paced finger tapping accuracy following repetitive magnetic stimulation of the cerebellum in humans. *Neurosci. Lett.* 306, 29–32
2 Hashimoto, M. and Ohtsuka, K. (1995) Transcranial magnetic stimulation over the posterior cerebellum during visually guided saccades in man. *Brain* 118, 1185–1193
3 Ugawa, Y. *et al.* (1991) Modulation of motor cortical excitability by electrical stimulation over the cerebellum in man. *J. Physiol.* 441, 57–72

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