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Briefing Note

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# Perceiving the speed of human action



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## Key Points

- What are the links between sensory processing and social processing?
- Can static cues about human body movement influence lower levels of visual motion processing?
- How does the brain construct representations of the real-world pace or speed of human actions?
- What are the contributions of perceptual and decisional factors to visual judgements?

Social interactions depend critically on visual information about other humans. Information about body movement is particularly important because it can convey social attributes such as dominance, mood, attractiveness, vulnerability and intent.

## Viewing Movement

The predominant view of how this motion information is processed in the brain divides the task into two parts:

- Primitive sensory features such as local direction and speed are processed in one part of the brain (the occipital lobe),
- While more complex social attributes such as gait and dynamic facial expression are processed in another part (the temporal lobe).

## Judgements

The project investigates the links between sensory processing and social processing, particularly in the context of motion perception. In research newly published in Nature Scientific Reports, we studied how observers make judgements about human movement speed. We found that these judgments are not fixed and stable, but rely on an internal standard or norm for movement speed that can be altered by relatively short periods of prior experience.



Our research participants viewed videos of walking or running figures and were asked to judge the speed of the figures in the video. After viewing slow movements for a short period, normal-speed playback appeared to be too fast, and had to be slowed down in order to appear normal. The opposite effect occurred after viewing fast movement for a while. So our judgements of speed are unconsciously influenced by previously viewed speeds.

## The 'adaptation' effect

This 'adaptation' effect has some interesting implications:

In the silent movie era, cine cameras and projectors were hand-cranked, so playback speed in the movie theatre was very variable depending on how quickly the projectionist cranked the projector. Our results indicate that the variation in playback was accepted by movie-goers because they quickly adapted to whatever playback speed was used; after a short while the actors appeared to be moving normally, whatever the playback speed.

In a modern context, after you have driven along a motorway at 70mph for a while, you may have had the experience that upon leaving the motorway it is easy to misjudge slow speeds and so approach the exit too fast. This may occur because, perceptually, 70mph became 'normal' speed after spending some time on the motorway, so 30mph appears slower than it appears while driving in a city

Slow-motion video replays from security cameras are increasingly used in criminal prosecutions, to help juries decide whether the crime was premeditated. A recent study in the USA found that after juries had viewed slow-motion replays they were more likely to convict the defendant for a premeditated offence. (Quick actions tend to be seen as off-the-cuff, without thought).

This season the Football Association has introduced reviews of penalty incidents, goals and red cards in order to check whether any offences were committed.

## Some conclusions...

- Our judgements of the speed of real-world objects are not stable and fixed, but vary markedly depending on recent visual experience.
- Multiple neural processes in the brain contribute to these judgements.
- Inferences about mood, intention and so on based on movement speed cannot therefore be considered as completely reliable.