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**Quantification of Nociceptive Escape Response in *C.elegans*[1]**
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Animals cannot rank and communicate their pain consciously. Thus in pain studies on animal models, one must infer the pain level from high precision experimental characterization of behavior. This is not trivial since behaviors are very complex and multidimensional. Here we explore the feasibility of *C.elegans* as a model for pain transduction. The nematode has a robust neurally mediated noxious escape response, which we show to be partially decoupled from other sensory behaviors. We develop a nociceptive behavioral response assay that allows us to apply controlled levels of pain by locally heating worms with an IR laser. The worms' motions are captured by machine vision programming with high spatiotemporal resolution. The resulting behavioral quantification allows us to build a statistical model for inference of the experienced pain level from the behavioral response. Based on the measured nociceptive escape of over 400 worms, we conclude that none of the simple characteristics of the response are reliable indicators of the laser pulse strength. Nonetheless, a more reliable statistical inference of the pain stimulus level from the measured behavior is possible based on a complexity-controlled regression model that takes into account the entire worm behavioral output.

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