Resource allocation in neural networks for motor control J. MIL-
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Venezuela, T. OHIRA, Sony Computer Science Lab, Japan — Multiplicative noise
plays an important part of a non-predictive control mechanism for stick balancing
at the fingertip. However, intentionally-directed movements are also used in stick
balancing, particularly by beginners. The interplay between intentional and non-
predictive control mechanisms for stick balancing was assessed using two dual task
paradigms: the subject was asked to either move one of their legs rhythmically or
to imagine moving their leg while balancing a stick (55.4 cm, 35 g) at their fin-
gertip. Performance was measured by determining the stick survival function, i.e.
the fraction of trials (total ≥ 25) for which the stick remained balanced at time t
as a function of t. Performance was increased by concurrent rhythmic leg move-
ments (50% survival time shifted from 8-9s to 15s in a typical subject). Imagined
movements resulted in a similar improvement (50% survival time of 20s for the above
subject) suggesting that this enhancement is not simply related to mechanical vibra-
tions of the fingertip induced by leg movement. These observations emphasize the
importance of the development of mathematical models for neural control of skilled
motor movements that take into resource allocation of limited resources, such as
intention.

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