

1 **APPENDIX C: Calculating the information value of fighting**

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3 The expected future fitness of an individual that has won n out of f fights, $W(f, n)$, is
 4 given by equation (A3). If this individual gets involved in another fight, it will be
 5 victorious with probability $B(f, n)$ (given by equation (4) in the main text), in which case
 6 its expected future fitness will change to $W(f + 1, n + 1)$. If, on the other hand, it is
 7 defeated, which happens with probability $1 - B(f, n)$, its expected future fitness will
 8 become $W(f + 1, n)$. Therefore, the average change in expected future fitness from
 9 engaging in one more fight can be calculated as

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$$\Delta W(f, n) = B(f, n) \cdot W(f + 1, n + 1) + [1 - B(f, n)] \cdot W(f + 1, n) - W(f, n). \quad (C1)$$

11 We refer to this as the information value of fighting. Note that it ignores the resource gain
 12 v associated with winning and the injury cost c associated with losing, and thus considers
 13 only the fitness effect of the change in information state.