TO THE EDITOR: In a recent article published in the *Journal of Neurophysiology*, Hawkins and colleagues (2015) show that evidence accumulator models (EAMs) and the urgency-gating model (UGM) are mathematically distinguishable in conditions where the sensory information used to make a choice is constant during the time course of a trial. With a model recovery method, they also demonstrate that the models are distinguishable in practice. Finally, they compare the performance of the two models in fitting real data from human and monkey subjects faced with constant input decision tasks. Here again, the authors show that the two models are discriminable in predicting these real datasets (Hawkins et al. 2015).

These results contradict the claim we made earlier (Thura et al. 2012) that EAMs and the UGM behave nearly identically in stable environment (see MATERIALS AND METHODS and Eqs. 27-29). In their paper, Hawkins et al. (2015) correctly demonstrate that our mathematical proof of equivalence was incomplete, as our equations did not consider the evolution of the intra-trial noise variance.

We acknowledge the authors for correcting us on this point. They are correct to say that the two models are not mathematically identical and can in principle be distinguished using constant evidence tasks. However, it is still an open question whether such tasks can reliably distinguish the models in practice.

First, the mathematical difference emphasized by the authors is significant if one assumes that variability mainly comes from within-trial fluctuations and not from across-trial variations. However, which type of variability dominates during the decision process remains under debate (see Carpenter and Reddi 2001; Ratcliff 2001 for an interesting discussion about this point). This is important because in situations where across-trial variations dominate, the models become less discriminable.

Second, even if we assume that models are indeed discriminable, how large is the difference? The authors show that EAMs fit the data from Ratcliff and McKoon (2008) better than the UGM and conversely, the UGM better fits the data collected in the Roitman and Shadlen study (2002). However, the differences in the goodness-of-fit are very modest. We believe this is because the models, while admittedly not strictly identical, still make very similar predictions when evidence is constant within trials. Model performances are in fact so similar that even sophisticated fitting methods provide inconclusive results. Other ways of dissociating models more efficiently are thus needed (see Thura 2015 for a discussion about this point).

Third, the correction reported by Hawkins et al. (2015) has no consequence on the motivation for why one should incorporate an urgency mechanism during decisions. It does not affect our derivations showing that decision-makers should drop their accuracy criterion as time is passing (implementing a growing urgency, Thura et al. 2012, Eqs. 1–11) to optimize their rate of reward. Reward rate is a crucial factor for subjects engaged in a decision task, and often, they aim to maximize it (Balci et al. 2011; Gold and Shadlen 2002). Interestingly, we and others showed that urgency signals allow the optimization of the reward rate by adjusting the speed-accuracy trade-off during decision-making (Ditterich 2006; Drugowitsch et al. 2012; Standage et al. 2011; Thura et al. 2014).

Finally and most significantly, the arguments of Hawkins et al. (2015) do not invalidate the experimental results we reported in our study (Thura et al. 2012). Regardless of whether the models can be reliably distinguished using constant evidence tasks, they can clearly and unequivocally be distinguished using changing evidence tasks. Our results strongly favor the UGM, and we are not aware of any proposal that an EAM, with any choice of parameters, can explain our data.

Thus, while we admit that our claim of equivalence between the models was incorrect with respect to within-trial variability, the results of our study and the conclusions we draw from them remain unchanged.

DISCLOSURES
No conflicts of interest, financial or otherwise, are declared by the author(s).

AUTHOR CONTRIBUTIONS
D.T. drafted manuscript; D.T. and P.C. edited and revised manuscript; D.T. and P.C. approved final version of manuscript.

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