A Bayesian reference model for visual time-sharing behaviour in manual and automated naturalistic driving
Supplemental material

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Abstract

This document presents the predictive posterior distributions for the Bayesian Generalized Linear Mixed Models defined in the paper *A Bayesian reference model for visual time-sharing behaviour in manual and automated naturalistic driving*. The posterior predictive distribution is the distribution of future—unobserved—data generated by the fitted model. The posterior predictive distribution can be used to assess whether the model can generate new data that resemble the observations used to fit it. This process is also known as *posterior predictive check*.

1 Off-path glance duration

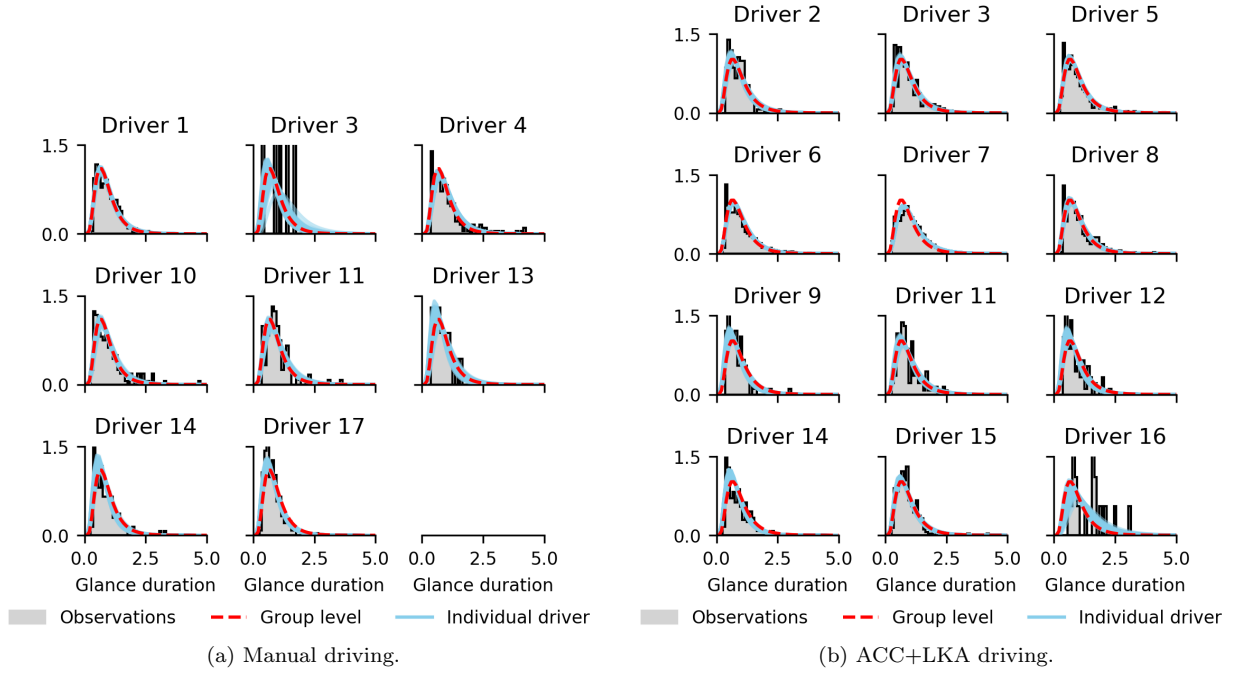(a) Manual driving.

(b) ACC+LKA driving.

Figure 1: Posterior predictive distribution in manual and ACC+LKA driving. The histogram of the observed data for the individual driver is shown in gray. The dashed red line indicates the log-normal posterior predictive distribution for the group level effect defined by the average value of the parameters in the Markov Chain Monte Carlo chain. The blue lines are a smattering of log-normal posterior predictive distributions from the Markov Chain Monte Carlo trace that include the individual driver effect (the wider the blue band the higher the uncertainty in the estimation).

2   On-path glance duration
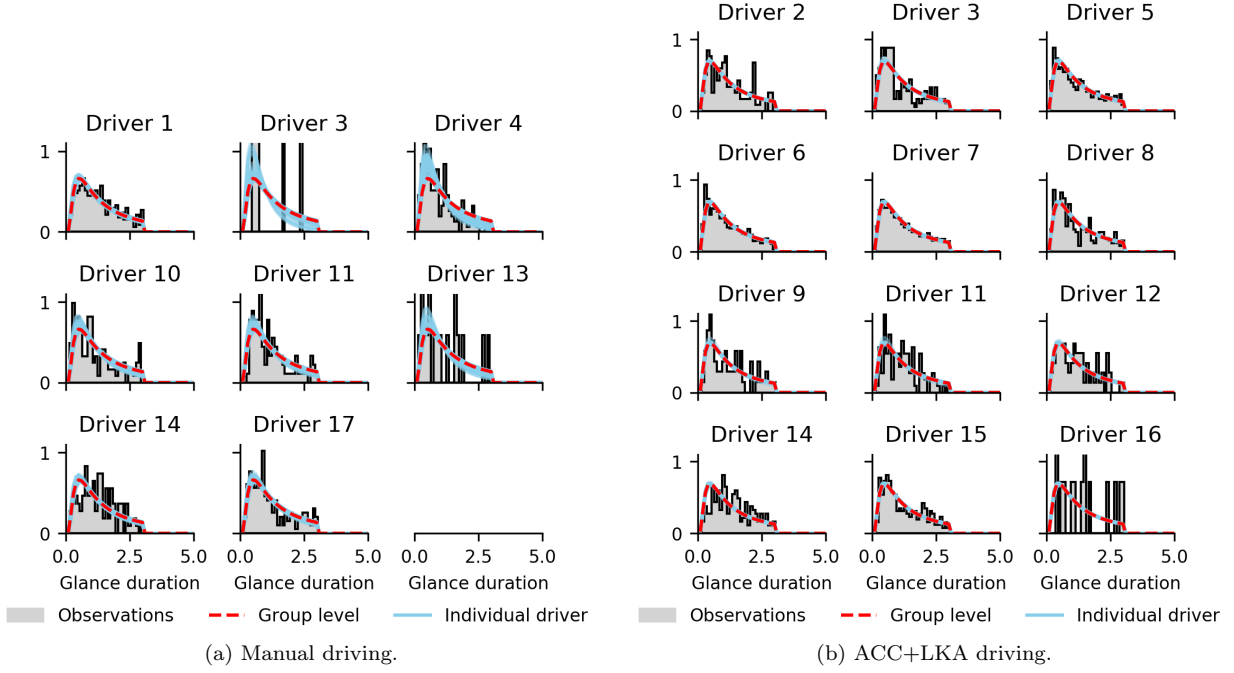

(a) Manual driving.

(b) ACC+LKA driving.

Figure 2: Posterior predictive distribution in manual and ACC+LKA driving. The histogram of the observed data for the individual driver is shown in gray. The dashed red line indicates the (truncated) inverse-gaussian posterior predictive distribution for the group level effect defined by the average value of the parameters in the Markov Chain Monte Carlo chain. The blue lines are a smattering of (truncated) inverse-gaussian posterior predictive distributions from the Markov Chain Monte Carlo trace that include the individual driver effect (the wider the blue band the higher the uncertainty in the estimation).

3   Percent road center (PRC)

(a) Manual driving.
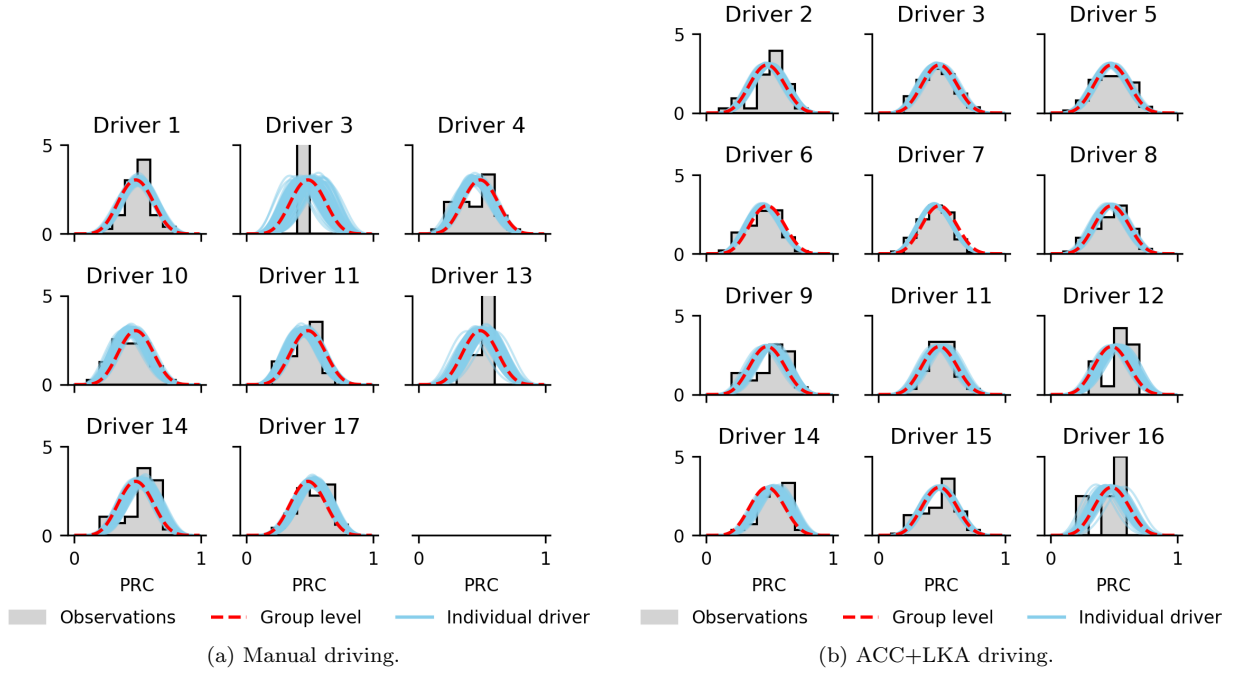
(b) ACC+LKA driving.

Figure 3: Posterior predictive distribution in manual and ACC+LKA driving. The histogram of the observed data for the individual driver is shown in gray. The dashed red line indicates the beta posterior predictive distribution for the group level effect defined by the average value of the parameters in the Markov Chain Monte Carlo chain. The blue lines are a smattering of beta posterior predictive distributions from the Markov Chain Monte Carlo trace that include the individual driver effect (the wider the blue band the higher the uncertainty in the estimation).

4   Total task duration (TTT)

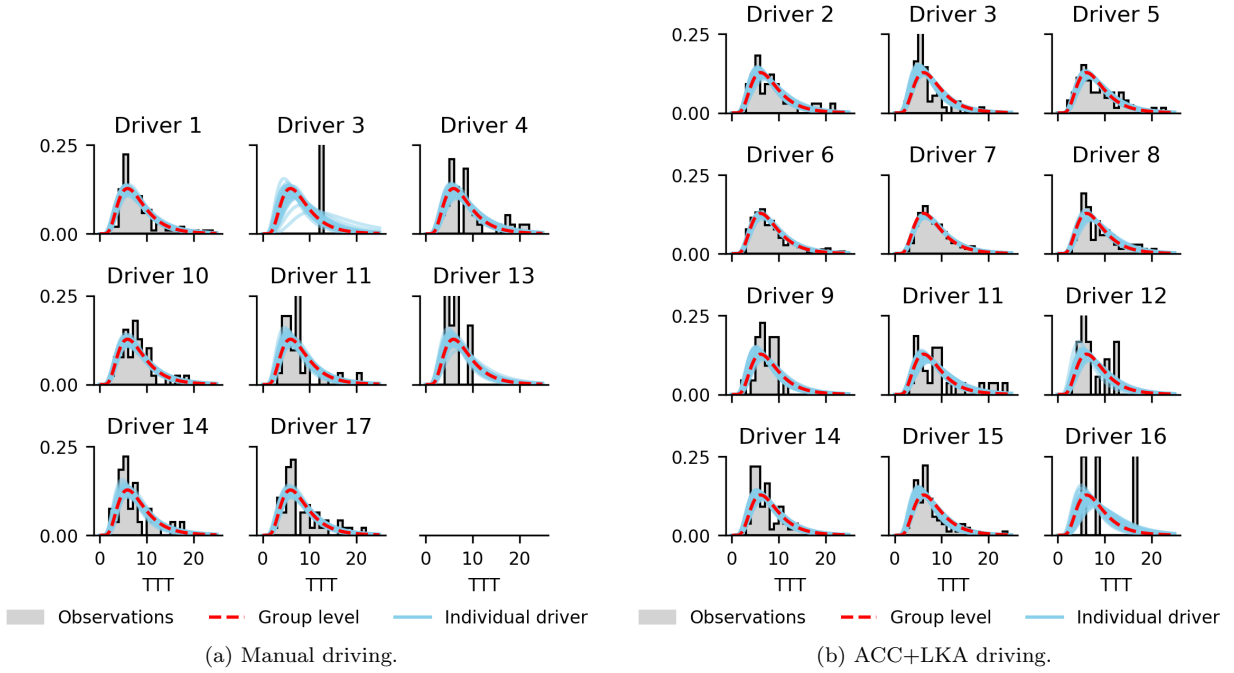

(a) Manual driving.

(b) ACC+LKA driving.

Figure 4: Posterior predictive distribution in manual and ACC+LKA driving. The histogram of the observed data for the individual driver is shown in gray. The dashed red line indicates the log-normal posterior predictive distribution for the group level effect defined by the average value of the parameters in the Markov Chain Monte Carlo chain. The blue lines are a smattering of log-normal posterior predictive distributions from the Markov Chain Monte Carlo trace that include the individual driver effect (the wider the blue band the higher the uncertainty in the estimation).