# Response to Reviewers

## # Reviewer 1

- Thank you for your comment. This is much appreciated.

## # Reviewer 2

We appreciate the reviewer's suggestion. The aim of the paper is to introduce and demonstrate a new computational tool. As such, this manuscript is not intended to articulate a substantial research question, but rather to provide a tool/method that could be used to address a variety of questions that require the calculation of travel matrices or the examination of multimodal transport routes.

Regarding the performance comparison between r5r and the opentripplanner R package. We have conducted a benchmark comparison and we have found that r5r is 2054 times faster than opentripplanner **on the example dataset used in this paper** (reproducible code can be found here <https://gist.github.com/dhersz/14c4b7927a9ef91aeddcc3bf8bd0712a>). However, we should note that opentripplanner focuses on point-to-point routing,**so it runs the routing algorithm for each O-D pair. However, due to the nature of the graph search process used in routing, finding a route from an origin to a destination also finds routes to all places closer to the origin than the destination. R5 takes advantage of this to compute an entire row of the travel time matrix simultaneously, while opentripplanner runs the routing algorithm once per O-D pair. Thus, the computation time for r5r scales near-linearly with the number of origins, regardless of the number of destinations, while opentripplanner computation times scale with the product of the number of origins and destinations. Thus, the difference of computation times will vary significantly depending on the dataset, but for any substantial travel time matrix** r5r **will be significantly faster. Additionally,** opentripplanner **provides far more details on each route than** r5r**, including their spatial geometries.** Because the **computational approaches and** outputs of the two packages are different, we believe this would not be a fair comparison and so we decided not to include it in the manuscript.

We changed the last two paragraphs of the first section of the paper to address these points in the text. The text now reads as follows (\*\*changes in bold**\*\***):

- **While there are several open-source routing packages available for R, they either do not support public transport networks (Padgham 2019), or primarily focus on providing point-to-point routes rather than origin-destination travel time matrices (Morgan et al. 2019; Lovelace and Ellison 2019). Most routing algorithms find paths to all points in the network while finding a single route. Storing these paths rather than computing them for one origin-destination pair at a time is orders of magnitude more efficient. To our knowledge, no R package exists that supports these efficient many-to-many queries for public transport networks.**

**To fill this gap**, this paper presents r5r, a new open-source R package for routing on multimodal transport networks based on the Rapid Realistic Routing on Real-world and Reimagined networks (R5) package. R5 is a powerful next-generation routing engine written in Java and developed at Conveyal (Conway, Byrd, and van der Linden 2017; Conway, Byrd, and van Eggermond 2018) to provide an efficient backend for analytic applications, such as accessibility analysis. The r5r package provides a simple and friendly interface to run R5 locally from within R **using seamless parallel computing.** **This tool can be used to address a variety of questions that require the efficient** calculation of travel matrices or the examination of multimodal transport routes.