

**To:** Transport & Health Policy Makers, & Practitioners  
**From:** Professor Adrian Davis  
**Date:** 2<sup>nd</sup> July 2024  
**Subject:** Essential Evidence 4 Scotland No.87 Just Noticeable Difference

---

Top Line: Just Noticeable Difference is a concept helpful in determining what additional interventions /actions may be required to have a noticeable effect. While used in other areas of public policy, it is largely absent in the road transport sector.

Just Noticeable Difference is a concept taken from environmental psychology. Ernst Weber was a 19th-century German physician who first described just noticeable difference (JND). Weber's Law states that the stronger the initial stimulus, the greater is the change in intensity required for the resulting stimulus to be perceived as different. Weber and his student, Fechner, found that the JND in any variable is proportional to the magnitude of that variable. Weber and Fechner using simple weights to see when people could detect a difference in weight. We're best at detecting relative differences — as a weight gets heavier we need a bigger difference to feel it.

JND has been applied to many areas of public policy, not least marketing, in order that manufacturers and sellers know how much more they might need to add to an existing product in order that it is noticeable in the hope that it increases sales. Weber's principle can be applied to product improvement by using a research technique to find the correct JND.<sup>1</sup> Another example, this time from medicine, is life expectancy and infant mortality. Writing in 2019, Dorling noted that there was not a single place in Europe, other than in the UK, where life expectancy was falling, or anywhere else in Europe where infant mortality was rising. He highlighted the statistics that showed that 3.6 babies died for every 1000 born in 2014 and this had risen to 3.9 in 2017. Is the idea of 0.3 of a child JND? The ONS reported that there were 679,106 births in 2017. That means 203 more babies died in 2017 than would have died in 2014 if the infant mortality had stayed the same.<sup>2</sup> Notably, Scotland had the same infant mortality of 3.6 deaths per 1000 births in 2014 as across the UK but the Scottish government diverted funding to mothers and babies. By 2018 it dropped to 3.2 deaths per 1000 births.<sup>3</sup>

JND has rarely been applied in road transport, at least in peer reviewed studies. One exception is from New Zealand where researchers investigated travel time savings and transfer time desired by public transport users with disabilities when selecting a route with transfer(s).<sup>4</sup> Analysis of 108 participant survey responses showed that public transport users with disabilities are more sensitive to travel time savings compared to users without disabilities. However, those who currently ride a direct route were less sensitive to travel time savings than those who currently make a transfer. Improvements in the quality of accessible features at stops/stations did not significantly affect the desired transfer waiting and walking times for users with disabilities. The increase in the average time taken, although not conclusive, may suggest that users with disabilities require more time to make a transfer at major interchanges compared to smaller stops/stations – a JND. Overall, participants with visual and physical impairments were revealed to be the most sensitive towards travel time savings, followed by those with cognitive impairments.

JND might also be applied to areas such as speed management to improve driver adherence to posted speed limits and where, for example, Vehicle Activation Signs and other interventions could add a JND.

---

<sup>1</sup> Britt, S, Nelson, V. 1976 The marketing importance of the “just noticeable difference”, *Business Horizons*, 194: 38-40.

<sup>2</sup> Lawson, E. 2020 Debrief Making a just noticeable difference, *British Journal of General Practice*, 70 (692): 122.

<sup>3</sup> Dorling D. 2019 The biggest story in the UK is not Brexit. It's life expectancy. *The Correspondent*; 16 Dec: [The biggest story in the UK is not Brexit. It's life expectancy - The Correspondent](#)

<sup>4</sup> Park, J., Chowdhury, S. 2022 Investigating the needs of people with disabilities to ride public transport routes involving transfers, *Journal of Public Transportation*, 24, 100010.