



# Gap Judgment and Gap Acceptance

When drivers are attempting to make a turn across the path of oncoming traffic, they often must determine whether it is safe to initiate a turn (e.g., when turning at an unsignalized intersection). This requires drivers to scan the roadway for oncoming vehicles and to judge whether there is sufficient time for them to complete the turn before an oncoming vehicle arrives. In the field of human factors, a driver's judgment of whether there is a sufficient gap in traffic to complete a maneuver is referred to as gap judgment. A driver's willingness to accept a particular size gap (e.g., distance of an oncoming vehicle from the intersection) is referred to as gap acceptance.

When drivers are making a go/no-go decision, the decision is often based solely on the perceived distance of an oncoming vehicle from the intersection. Importantly, drivers' gap judgment is largely based on the assumption that oncoming vehicles are traveling at or near typical roadway speeds (e.g., at or near the speed limit) rather than an explicit attempt to determine and evaluate an oncoming vehicle's speed (1). Therefore, when an approaching vehicle is traveling much faster than roadway speeds, a driver's ability to accurately judge the gap is significantly degraded.

A driver's willingness to accept a gap is based on their ability to judge the gap as well as roadway and traffic-related factors, driver-related factors, environmental factors, and other factors (2). Roadway factors include the number of lanes, traffic control devices, traffic volume, and traffic speed. Driver factors include age, gender, emotional state, driving experience, and waiting time. Environmental factors include time of day and weather. Other factors include the presence of passengers, the presence of following vehicles, the approaching vehicle type and size, and the subject vehicle type and size.

Research on gap acceptance has shown that the minimum gap distance that drivers are willing to accept is likely to be at the threshold distance for judging closing rate (1). The threshold distance (i.e., the distance at which closing rate can be perceived) can be calculated using the following equation:

$$D_{TH} = \sqrt{\frac{W * V}{.003}}$$

where

W = the width of the approaching vehicle (ft)

V = closing rate in feet per second

The minimum gap time that most drivers of passenger vehicles are willing to accept ranges from approximately 4-6 seconds depending on the circumstances (2,3).

In motor vehicle crashes involving a turning vehicle, human factors experts evaluate the reasonableness of a driver's decision to turn across oncoming traffic by comparing their actions to what other drivers are likely to do under similar circumstances. This includes analyzing the turning driver's ability to accurately judge the gap and their decision to accept a particular size gap under the circumstances.

**If your case involves a collision with a turning vehicle, contact Dr. Nancy Grugle to discuss how gap judgment and gap acceptance may have played a role in the collision.**

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