Modeling of driving behavior using FRAM model and analysis of occurrence factors of accidents and near-miss incidents Here

Daisuke Ito [1]   Yuki Watanabe [1]

1) KansaiUniversity, Faculty of Societal Safety Sciences
7-1 Hakubai-cho, Takatsuki, Osaka, 569-1098, Japan (E-mail: dito@kansai-u.ac.jp)

Driving behavior was modeled using the Functional Resonance Analysis Method (FRAM), which focuses not only on failures and accidents as in conventional safety analysis methods but also on success factors. The connections between each function related to safe driving were visualized. Furthermore, we analyzed the relationship between the occurrence of accidents/near-miss incidents and the loss of functions in the FRAM model using the Near-Miss Incident Database.

In this study, two scenarios, "passing through a narrow intersection" and "turning left onto a priority road" were analyzed. First, the FRAM models were constructed by referencing safety driving behaviors. Figure 1 shows the FRAM model for the case of a right turn at an intersection. There are 10 functions to archive safe driving. Then, for each accident and near-miss incident case, we checked which of the functions of the constructed FRAM model caused the accidents.

In passing through a narrow intersection, not predicting that something will run out into the intersection is related to the occurrence of accidents/near-miss incidents. In turning left onto a priority road, not stopping temporarily before a priority road is related to the occurrence of accidents/near-miss incidents.

The FRAM model enabled us to clarify the interaction of the various operations and behaviors that contribute to safe driving when passing through intersections and turning left onto priority roads. However, the resulting FRAM model is not perfect and should be repeatedly evaluated and validated by various researchers, including the authors. In the future, it is necessary to develop FRAM models for various traffic situations and to clarify errors in functions related to the occurrence of accidents.
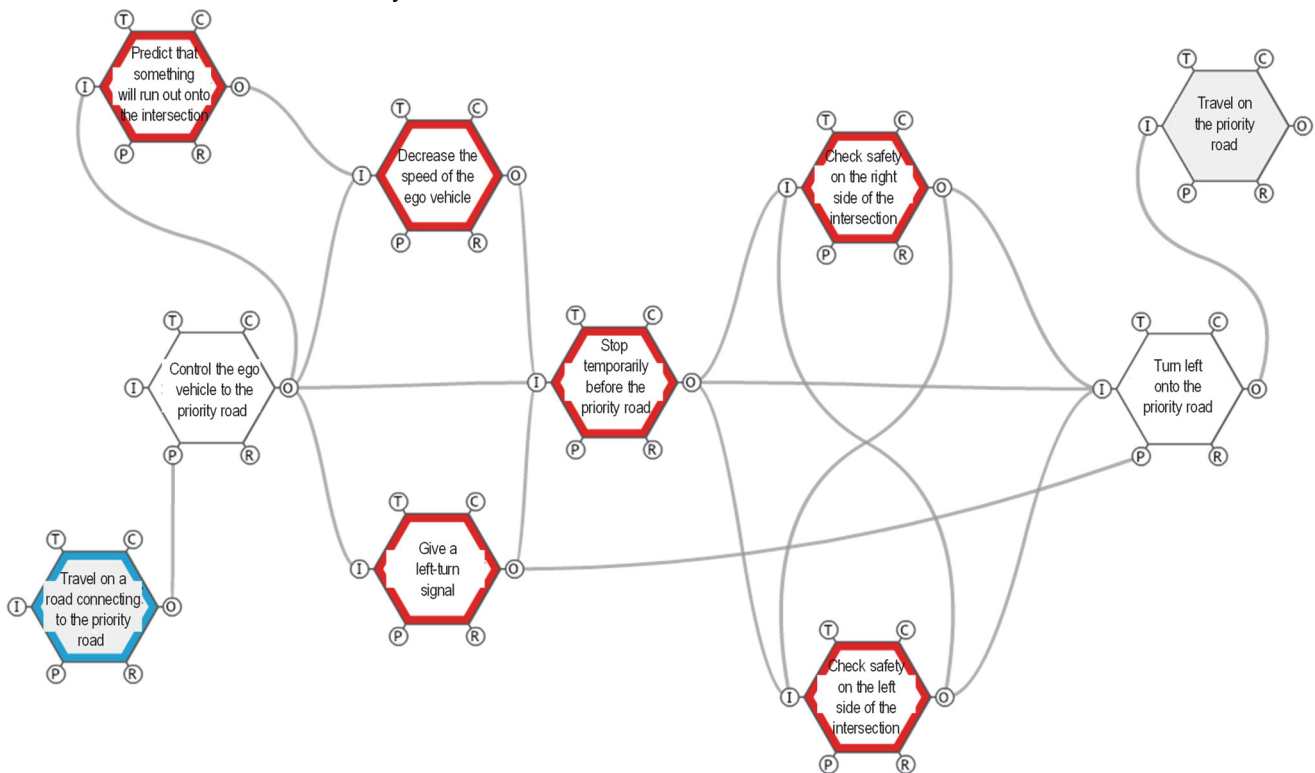

Fig. 1 A FRAM model of driver's behavior in turning left onto a priority road