

# Analysis of Police Pursuit Data

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## **Analysis of the effects of explanatory variables on the reasons for pursuit termination**

We investigated the effect of a number of explanatory variables (officer years of service, race, gender, full-time versus part-time status, initiating event, duration of pursuit, and locale) on the reasons for pursuit termination.

To facilitate the analysis it was necessary to reduce the number of categories of initiating event. Based on advice from Police Training Institute staff, the original thirteen categories of initiating event were grouped into five categories according to seriousness of the event:

Firearm Use, Felony Crime, and Felony Violent Crime Warrant were characterized as most serious and coded as “most\_eve”;

Misdemeanor, Minor Traffic Violation, and Outstanding Misdemeanor Warrant were characterized as least serious and coded as “least\_eve”;

Suspected DUI, Reckless Driving, and Suspected Criminal Activity were grouped together and coded as “DUI\_eve”;

Felony Property Crime Warrant and Wanted by Another Agency were grouped together and coded as “property\_eve”;

Suspect Stolen Vehicle and Others were grouped together and coded as “other\_eve.”

The SAS procedure GENMOD was used to construct appropriate models with a Poisson distribution and a logarithmic link function. Of the 725 reports in the database, 634 contained all the relevant variables for the selected model and could therefore be used in the analysis.

Here is a summary of the results:

- The initiating events DUI\_eve and least\_eve and the officer's years of service have highly significant effects on the reason for pursuit termination.
  - The P-value for DUI\_eve is 0.00015 (any P-value below 0.05 is considered statistically significant).
  - The P-value for least\_eve is 0.0001.
  - The P-value for years of service is 0.0037.
- No other explanatory variables were significant.
- The initiating event DUI\_eve is associated with a high incidence of terminations in which the suspect surrendered or the officer voluntarily terminated pursuit.
  - 33.64% of DUI\_eve pursuits terminated with the suspect surrendering, versus 24.072% of non-DUI\_eve pursuits.
  - 17.29% of DUI\_eve pursuits terminated with the officer voluntarily terminating pursuit, versus 10.76% of non-DUI\_eve pursuits.

- The initiating event DUI\_eve is associated with a low incidence of terminations in which the suspect fled on foot.
  - In 9.81% of DUI\_eve pursuits the suspect fled on foot, versus 14.09% of non-DUI\_eve pursuits that terminated in this way.
  
- The initiating event least\_eve is associated with a low incidence of terminations in which the suspect fled on foot.
  - 10.93% of least\_eve pursuits terminated with the suspect fleeing on foot, versus 14.86% of non-least\_eve pursuits that terminated with the suspect fleeing on foot.
  
- The initiating event least\_eve is associated with a high incidence of terminations in which the suspect surrendered.
  - 31.47% of least\_eve pursuits terminated with the suspect surrendering, versus 22.00% of non\_least\_eve pursuits that terminated with the suspect surrendering.
  
- When the officer has between ten and twenty years of service, it is less likely that the pursuit will be terminated by a supervisor or by a crash scenario.
  
- When the officer has less than fifteen years of service, it is more likely that the suspect will flee on foot or that the officer will voluntarily terminate the pursuit.

## **Analysis of the effects of explanatory variables on the occurrence of crashes**

The SAS procedure LOGISTIC was used to construct appropriate models with a binary response. Of the 725 reports in the database, 378 contained all the relevant variables and could therefore be used to select variables that are likely to have significant effects on the response. 500 reports contained the selected variables and were used in the analysis.

The effects of distance of pursuit and initiating event on the occurrence of crashes were investigated.

- Least\_eve has significant effects on the occurrence of crashes, whereas distance has some effects that are on the boundary of the 0.05 significance level.
  - The P-value for least\_eve is 0.0082.
  - The P-value for distance is 0.0518.
- The pursuit distance of range 2 to 3 miles is associated with a high occurrence of crashes. The initiating event least\_eve is associated with a low occurrence of crashes.
  - In 5.57% of pursuits without crashes the distance was 2 to 3 miles, while in 8.09% of pursuits with crashes the distance was 2 to 3 miles.
  - In 56.30% of least\_eve pursuits, no crash occurred.
- Other explanatory variables were not significant.

## **Analysis of the effects of explanatory variables on stop techniques**

We also examined the effect of the explanatory variables on the stop technique. None of the explanatory variables was significant, which may be due to sparseness of the data (relatively few reports indicated which stop technique was used).