



**CALIFORNIA STATE SCIENCE FAIR  
2014 PROJECT SUMMARY**

<b>Name(s)</b> <b>Benjamin J. Schall</b>	<b>Project Number</b> <b>J0423</b>
<b>Project Title</b> <b>Finding the Most Effective Delay for Delayed Auditory Feedback: Improvements on Speech Jamming</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective was to see at what delay is "Delayed Auditory Feedback"(DAF) most effective at inducing difficulty in speech. I believed that it would be 200ms, which is what a previous study deduced.</p> <p><b>Methods/Materials</b> Informed consent was received by 20 different people ranging from ages 9-69; 11 were female and 9 were male. They were subjected to DAF under a delay of 100, 150, 200, and 250 milliseconds using noise-cancelling headphones, a microphone, and a DAF program; a control was also used with no feedback. The subjects were instructed to answer 5 questions under the influence of DAF. They were then instructed to answer on a scale of 1-10, 1 being "without any troubles" and 10 being impossible, how hard it was for them to say the answer to the question. They repeated this process until all delays and control were tested.</p> <p><b>Results</b> I found that the average difficulty of Control was 1.16, 100ms was 3.33, 150ms was 3.75, 200ms was 4.14, and 250ms was 4.84.</p> <p><b>Conclusions/Discussion</b> 250ms, my maximum delay, had the highest difficulty, with all other delays having difficulties corresponding to amount of time delayed; with lower delays having lower difficulties and higher delays having higher difficulties. This indicates that something higher than 250ms would result in harder difficulties. This project therefore shows that more research needs to be conducted to determine the peak of DAF effectiveness, and that 200ms is not the most effective.</p>	
<b>Summary Statement</b> What delay causes the most difficulty in people under DAF.	
<b>Help Received</b> Mother helped with transport of myself and patients; Dad's friend lended the headphones	