Secants and Tangents, the k-secant Lemma

According to the celebrated "Trisecant Lemma", the "general" projection of a smooth algebraic curve on a plane has only ordinary double points. In other words, the trisecants, the tangents and the stationary bisecants (all of them shall be explained) do not fill up the space.

I intend to discuss first this classical result, hoping in particular to attract the interest of those who have never heard of it. Then I will explain why a natural generalization is easy to state but not as easy to prove as it should.
The role and importance of tangents, which do not appear in the case of the "Trisecant Lemma" will be clarified in this new context. The relations with classical results of Mather and Ran and with a recent result of Behershti---Eisenbud will also be commented.

In the second part of the talk, I will try to give a brief presentation and an elementary description of the Hilbert Scheme of aligned subschemes of a smooth algebraic variety. I will then show that elementary calculus in one variable is a good tool for a local study of this Hilbet Scheme and certainly sufficient to complete the proof of the "k-secant (and tangent) lemma".