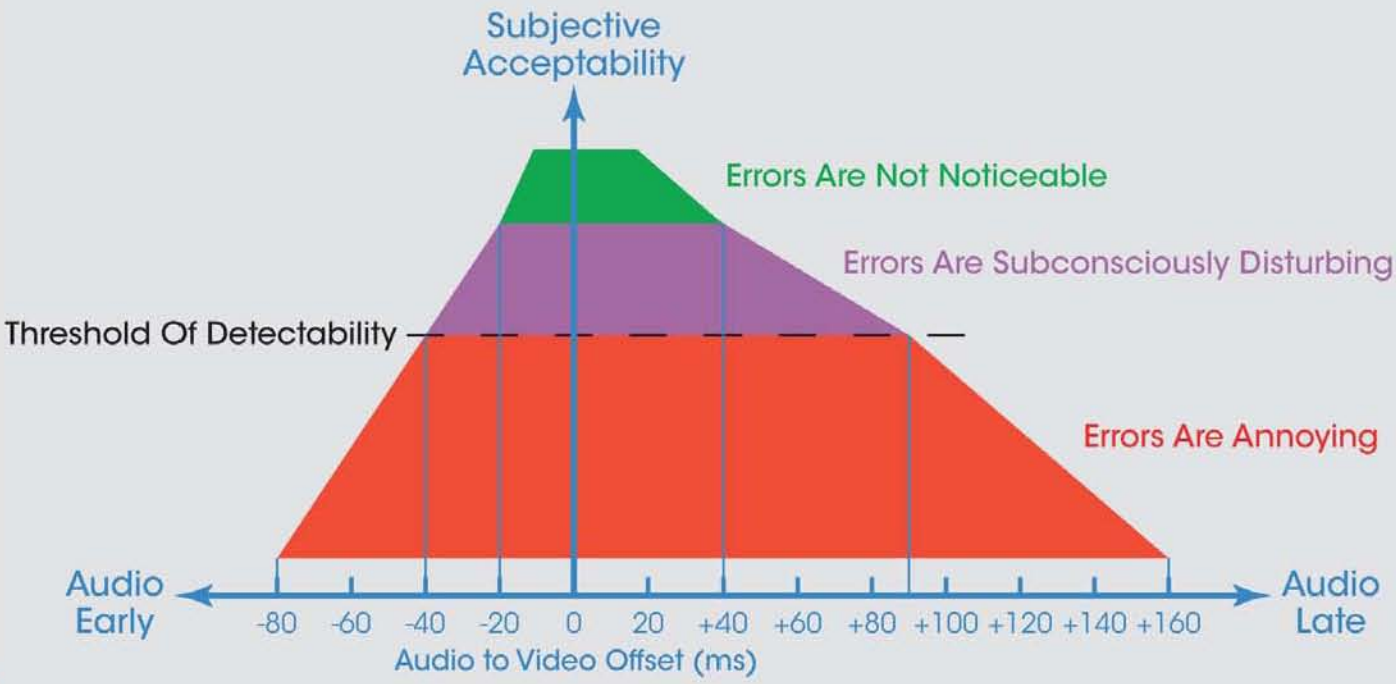
Typical Viewer Perception Of Lip Sync Errors



Perception Of Lip Sync Errors

Although individual viewers may have slightly different thresholds for detecting lip sync errors, the subjective acceptability of program material has the general characteristics shown above.

Our brains are at least two times more sensitive to early audio than to late audio. The slow speed of sound relative to the speed of light in our natural world has conditioned us to expect audible events to occur after the corresponding visible events.

Unfortunately, even when the lip sync error is large enough to be clearly visible (the red region) our brains are unable to identify the size of the error with any accuracy. Correcting the lip sync becomes a subjective and time consuming trial and error process.

Subconscious Effects

The most disturbing lip sync errors are those we do not "see". For most viewers, if the audio is less than 40 ms early and less than 90 ms late, the brain does not consciously register a lip sync error. However, studies[1] have shown that errors below this detectability threshold can have the subconscious effect of making the program material less believable, less honest and less trustworthy. Therefore, when audio is early by 20-40 ms or late by 40-80 ms the seemingly "invisible" lip sync error can still be detrimental.

The Zero Tolerance Goal

Small errors in the green region may not be a problem. But the cumulative effect of cascaded small errors can quickly put you into the magenta or red regions (subconscious or visibly annoying). Therefore, audio to video offsets should be kept as close to zero as possible at all stages of the production and distribution paths.

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[1] Effects of Audio-Video Asynchrony on Viewer's Memory, Evaluation of Content and Detection Ability
Research Report Prepared for Pixel Instruments
Byron Reeves & David Voelker
Stanford University
October 1993