**Supplementary material**

Causality and phase linearity are separate (albeit in many usages related) definitions. All combination of the two filter properties are possible.

**Causal – Linear phase**

Example: Mean value of K past events

**Non-causal – Linear phase**

Example: Mean value of K (odd) events surrounding time 0

**Causal – Non-linear phase**

Example: Weighted mean value of K past events

**Causal – Non-linear phase**

Example: Weighted mean value of K events with a positive offset T