

Channel Model:

$P(p \rightarrow p) = 0.9$ $P(p \rightarrow b) = 0.1$
 $P(b \rightarrow b) = 0.95$ $P(b \rightarrow p) = 0.05$
 $P(ch \rightarrow ch) = 0.8$ $P(ch \rightarrow ts) = 0.2$
 $P(ts \rightarrow ts) = 0.95$ $P(ts \rightarrow ch) = 0.05$
 $P(ee \rightarrow ee) = 1.0$

P(Observation | Signal):

	/peech/	/beech/	/peets/	/beets/
peach	0.72	0.08	0.18	0.02
beach	0.04	0.76	0.01	0.19
beats	0.0025	0.0475	0.0475	0.9025

P(Observation | Signal) P(Signal)
(signal uniformly distributed)

	peach	beach	beats
/peech/	0.24	0.01333	0.00083
/beech/	0.02333	0.25333	0.01583
/peets/	0.06	0.00333	0.01583
/beets/	0.00666	0.06333	0.30083

P(Observation | Signal) P(Signal)
(P(peach) = 0.02, P(beach) = 0.7, P(beats) = 0.28)

	peach	beach	beats
/peech/	0.0144	0.028	0.0007
/beech/	0.0016	0.532	0.0133
/peets/	0.0036	0.007	0.0133
/beets/	0.0004	0.133	0.2527

Suppose:

Language model: $P(\text{peach}) = 1/1000$
 $P(\text{peak}) = 1/2000$
 $P(\text{peacock}) = 1/20000$

and

Acoustic model: $P(\text{peach} \rightarrow /peekak/) = 0.1$ $P(\text{peach} \rightarrow /peech/) = 0.9$
 $P(\text{peacock} \rightarrow /peek/) = 0.1$ $P(\text{peacock} \rightarrow /peekak/) = 0.9$
 $P(\text{peak} \rightarrow /peakak/) = 0.1$ $P(\text{peak} \rightarrow /peek/) = 0.9$

So: $P(\text{peach} \mid /peekak/) = 0.1 * 1/1000 = 0.0001$
 $P(\text{peacock} \mid /peekak/) = 0.9 * 1/20000 = 0.000045$

$P(\text{peacock} \mid /peek/) = 0.1 * 1/20000 = 0.000005$

$P(\text{peek} \mid /peek/) = 0.9 * 1/2000 = 0.00045$

'Peacock' is never received!!!