Algorithm 1: tGMM

Input:

$x[i,d]$: The timeseries for which we are estimating the mixture parameters for. Of dimensionality timesteps x features.
means: an initial guess at the means.
covs: an initial guess at the covariances.
$\pi[trials, conditions, t]$: some pi-vector indicating the contributions of each condition. Each timestep sums to 1. Use the pi-vec from a specific subject.
tol: the tolerance for defining convergence. Model is said to converge if there is an observed change in the likelihood by less than this amount.

Result:

tmeans: the tGMM estimated means.
tcovs: the tGMM estimated true covariance matrices.
π: passes through the pi vector.

$likelihood(x, means, covs) \leftarrow \left(\sum_{i=1}^{nt} \log\left[\sum_{c=1}^{nc} \pi_{ic} N(x_i|\mu_c, \Sigma_c)\right]\right)$
$nt = numtimesteps$
$nc = numconditions$
converged = FALSE
while $converged = FALSE$ **do**
  for *c in 1:nc* **do**
    $sumcond = \sum_{c'=1}^{nc} N(x_i|\mu'_c, \Sigma'_c)$
    for *i in 1:nt* **do**
      $resp_{ic} = \frac{\pi_{ic} N(x_i, \mu_c \Sigma_c)}{sumcond}$
    end
  end
  $meanresp = mean(resp, dim = 2)$
  for *c in 1:nc* **do**
    $tmeans_c = \frac{resp_c^T x}{meanresp_c}$
    $tcovs_c = \frac{\sum_{i=1}^{nt} r_{ic}(x_i - tmeans_c)^T (x_i - tmeans_c)}{meanresp_c}$
  end
  $newll = likelihood(x, tmeans_c, tcovs_c)$
  if $newll - ll > tol$ **then**
    $ll = newll$
  end
  else
    converged = TRUE
  end
  return(tmeans, tcovs, π)
end