EEG based brain state decoding has numerous applications. State of the art decoding is based on processing of the multivariate sensor space signal, however evidence is mounting that EEG source reconstruction can assist decoding. EEG source imaging leads to high-dimensional representations and rather strong a priori information must be invoked. Recent work by Edelman et al. (2016) has demonstrated that introduction of a spatially focal source space representation can improve decoding of motor imagery. In this work we explore the generality of Edelman et al. hypothesis by considering decoding of face recognition. This task concerns the differentiation of brain responses to images of faces and scrambled faces and poses a rather difficult decoding problem at the single trial level. We implement the pipeline using spatially focused features and show that this approach is challenged and source imaging does not lead to an improved decoding. We design a distributed pipeline in which the classifier has access to brain wide features which in turn does lead to a 15% reduction in the error rate using source space features. Hence, our work presents supporting evidence for the hypothesis that source imaging improves decoding.