Dynamical attractor basin structures provide a useful framework for understanding the fine-grained time-course of sense activation under lexical ambiguity [1]. A distinctive claim of such systems is that ambiguous words involve two attractor basins in a visual/semantic space separated by a saddle point (Point S, Figure 1). The saddle point corresponds to a blend of interpretations. In an artificial lexicon [2], we created well-balanced blend stimuli to probe the predictions of saddle point models. When a syllable is spoken in a visual context, a phonological basin structure is temporarily superimposed on the visual/semantic structure. The first syllable of a Temporarily Ambiguous (TA) word superimposes the one-trough basin structure of Figure 2 on Figure 1 producing the first part of trajectory TA in Figure 1. The second, disambiguating symbol of a TA word superimposes the two-trough structure of Figure 3, producing the swerve to the right in trajectory TA. Once the spoken input stops, the Figure 1 basin structure drives the trajectory to the right-hand attractor. A blend stimulus, not trained, was created by combining one feature from each of the two images corresponding to the trained TA word (Figure 4). The rate of looking to the blend at test is predicted by the distance between trajectory TA and the saddle point. Thus the TA blend should rise in fixation proportion, then fall. On the other hand, both first and second syllables of a Wholly Ambiguous (WA) word superimpose Figure 3 on Figure 1 (second syllable more weakly), producing trajectory WA. Thus, a WA blend should first fall in fixation proportion, then rise, then fall again (after spoken input has stopped).
WA words, as well as a gradual decrease (also predicted) for UA words (Figure 5; growth curve analysis [4]).

![Figure 4. An example of a blend stimulus.](image)

![Figure 5. Mean blend fixation proportions. The dotted (UA), dashed (TA), and solid (WA) lines fitted by the growth curve modeling were overlayed on the empirical data.](image)

We describe a recurrent network implementation of the model. The pattern of waxing and waning of looking rates supports a framework that includes saddle points.

References: