tures and consideration of the specific relations those features play, will require consideration of labeled relations.

We hypothesize that a feature is central to the extent that other (central) features depend on it, and that it will be judged immutable in proportion to its centrality. Preliminary evidence in support of these hypotheses is reported in Love (1996). He shows that priming people with a feature that is dependent upon a second feature increases judgments of the immutability of the second feature, but presenting the second feature has no effect on judgments of the first. For example, in the context of birds, the ability to fly depends on having wings whereas having wings does not depend on the ability to fly. Presenting *can fly* increased the immutability of *has wings*, but presenting *has wings* had no effect on the immutability of *can fly*. Increasing the availability of a feature that depends on a second feature increased the immutability of the second feature.

We further test our hypotheses by implementing them in a simple, iterative, linear equation. Specifically, let D be a matrix to be empirically determined that represents the pairwise dependencies between all features of a concept. A particular cell of D, d_{ij}, is a positive number representing the degree to which feature j depends on feature i. D should also be indexed by the relevant concept, but this will always be clear from context and so will be omitted. We express our centrality hypothesis as

$$c_{i,t+1} = \Sigma_j d_{ij} c_{j,t} \tag{1}$$

where $c_{i,t}$ is the centrality of feature i at time t. According to the equation, the centrality of feature i is determined at each time step by summing across every other feature's degree of dependence upon feature i multiplied by that feature's centrality. In terms of mutability, if a highly immutable feature depends upon feature i, feature i becomes more immutable than if a mutable feature were instead to depend on it. Furthermore, the feature would be much more immutable if a feature depended upon it that other features, in turn, depended upon. The iterative nature of Equation (1) is intended to accommodate such non-local effects.

To implement the model, immutability ratings must be set to some initial arbitrary value, a value that is almost always inconsequential for the final state because Equation (1) is linear. In the implementations below, all $c_{i,0}$ were set to 0.5. The model iterates until it converges. Mathematically, the model is a repetitive matrix multiplication and is known to converge to a solution in a small number of steps (Wilkinson, 1965); specifically, it converges to a family of vectors in the direction of the eigenvector of the dependency matrix with the largest eigenvalue. The model converges when it is attracted to a state in which satisfactory immutability assignments are made for all features simultaneously.

What are Dependency Relations?

Dependency relations exist between features. Of course, features can be defined at a variety of levels of abstraction. In a formal sense, features are isomorphic to classes (the feature of being a multi-millionaire athlete picks out the same people as are encompassed by the class of multi-millionaire athletes). Classes obviously come at various levels of abstraction and, due to the isomorphism, features must too. The convention in the study of categorization is to assume a basic-level of categorization (see Murphy & Lassaline, 1997, for a