2 Background, motivation and aims

This investigation was concerned with the behaviour of language in speech communities. When members of a community, or *speakers*, interact there are numerous possible linguistic objects and structures, e.g. words, phrases or idioms, which can be used to express particular meanings. In many cases an individual may have to choose one linguistic object out of a number of alternatives with the same meaning. For example, 'couch', 'sofa' and 'chesterfield' are all words that refer to the same physical object. The focus of this study was on exploring how such choices are made and, more specifically, how preferences towards a particular way of expressing certain meanings emerge based on interactions between individuals.

2.1 Selection mechanisms

Language change can be modelled as a two-step evolutionary operation, consisting of the generation of variations and the propagation of such variations through the speech community [1]. The variations produced are known as *variants* of a particular *linguistic variable*. Variants corresponds to the linguistic objects and structures mentioned previously, while the variable corresponds to the associated meaning. In the above example, the words 'couch', 'sofa' and 'chesterfield' are the variants and the physical object they correspond to is the linguistic variable. The fundamental dynamical process of this evolutionary procedure is replication, in particular the replication of linguistic objects and structures, or variants, through speech. Speaking a collection of variants is referred to in the following as producing an *utterance*. Each time a speaker produces an utterance he/she replicates variants they have heard before. In other words, this replication process is controlled by the speaker and their knowledge of the language, which has been previously determined by the language he/she has been exposed to. The interactions a particular speaker has experienced in the past will therefore influence those in the future, i.e. a speaker builds a usage-based memory of the variants which controls the outcome of future interactions.

The central element in processes of the type above is unit of replication, called the *replicator* [2]. An example of a replicator in biological evolution would be a gene, which is replicated during the production of sex cells (meiosis) and passed on to the offspring of an individual. In language change the replicator is a variant, which is replicated during speech interactions between individuals [3]. It can be argued that, in addition to replicators, *interactors* are also required for selection to occur [2], where selection is in the Darwinian sense that one replicator will survive by out-competing another. Returning to the example of biological evolution, the interactors are organisms which are responsible for replication through interactions between one another. In other words, an organism reproducing means that it's genes are replicated and are thus propagated throughout a population, otherwise they (the genes) will go extinct. This is a classic example of selection. Similarly, in language change the speakers are the interactors which replicate certain variants; if speakers select to replicate one variant more than another then the unused variant will eventually become extinct.

The theory of utterance selection, as presenting in [1], distinguishes between two forms of

selection: *interactor selection* and *replicator selection*. Interactor selection labels the fact that an interactor may be influenced by some interactors more than others. The difference in influence can be due to either the frequency with which certain interactors interact, i.e. the more often two individuals interact the greater their influence on one another, or the interaction of an interactor with a particularly strongly influential individual. The former can be thought of, in context of language behaviour, as an individual interacting with their neighbour more than with someone from another town, while an example of the latter would be the influence over an individual a friend has in contrast to an acquaintance. Replicator selection stems from the replicator and corresponds to the preference of an interactor towards a particular replicator. Replicator selection is thus an intrinsic property of a replicator. In a speech community, an example may be when a speaker prefers to use words or phrases commonly used by speakers they wish to associate with.

In summary: variants of linguistic variables and speakers correspond to replicators and interactors respectively with interactions propagating the replicators through the community; during speech a speaker utters a collection of variants which are replicated; variants are selected according a speaker's usage-based knowledge of the language, which arises as a consequence of the two sources of selection discussed above; the action of selection during each interaction alters a speakers knowledge of the language and thus influences the frequencies with which certain variants will be replicated in future; consequently it is possible for a variant to out-compete others, i.e. for the community to collectively reach a consensus as to which variant they use.

2.2 Historical language change

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