The structure of relations in linear spaces

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It will be shown that linear relations in finite-dimensional spaces can be classified in three classes:

1. *multishifts*, i.e., injective operators without eigenvalues;

2. *Jordan relations*, i.e., relations with a finite number of eigenvalues (including possibly ∞), which are made up of the corresponding Jordan chains;

3. *completely singular relations*, i.e., multivalued relations which are made up of so-called singular chains; their eigenvalues fill up the set of complex numbers including ∞.

Any linear relation can be decomposed into a direct sum consisting of the above objects.