Process models play a key role in the development of software systems, whether they are used to document system requirements or serve as implementation artefacts. In recent years, it was advocated to ground analysis of process models not directly in their inherent procedural description, but rather to rely on a declarative characterization of their behaviour. Then, behavioural relations are defined over pairs of actions of the model and capture characteristics of the occurrences of these actions, such as exclusiveness, concurrency, or precedence. In this talk, we first give an overview of applications of behavioural relations for analysis, reaching from similarity search, over change propagation, to log-based conformance analysis. However, we observe that many of these techniques can be instantiated with different sets of behavioural relations, whereas even for a single semantics assumed for a process model, there is a lack of understanding of subtle differences in the definition of such relations. Therefore, in the second part of the talk, we explore this spectrum of behavioural relations for the case of process models that are given as Petri nets and interpreted under linear-time, concurrent semantics. For this setting, we introduce the 4C spectrum of behavioural relations that captures four fundamental properties: co-occurrence, conflict, causality, and concurrency. We show that this spectrum gives rise to implication lattices and also highlight operationalisations for some of the relations.