THE COMPUTER TECHNOLOGY IN THE BEHAVIOURAL SCIENCE RESEARCH GROUP

Antonio Solanas Pérez
Departament Metodologia de les Ciències del Comportament
Facultat de Psicologia
Universitat de Barcelona

The computer technology in the behavioural science research group develops mathematical and statistical models for describing behavioural and psychological processes. Since the eighties a group of researchers in Barcelona has been studying behaviour sequences analysis, statistical analysis of $N = 1$ designs, analytical techniques for simulating and describing social behaviour, measurement of typicality in scene categorization processes, and statistical analysis of bioelectric signals.

Behaviour sequences analysis: A basic property of behaviour is that it unfolds in time. In order to be able to describe and explain certain behavioural phenomena, it is necessary to observe, code, and analyze sequences of behaviour. Such analysis is helpful for uncovering patterns of behaviour and for depicting their temporal dynamics. Since the early eighties the behavioural science group has developed software for the statistical analysis of behavioural sequences (Bakeman and Quera, 1992, 1995*a*, 2000), and has proposed some improvements to the techniques used in that field (Bakeman, McArthur and Quera, 1996; Bakeman and Quera, 1995*b*; Bakeman, Quera, McArthur and Robinson, 1997; Bakeman, Robinson and Quera, 1996; Quera, 1990; Quera and Bakeman, 2000).

Statistical analysis of $N = 1$ designs: It is well known that problems arise when standard statistical techniques (such as the t-test and ANOVA) are used for analyzing data from $N = 1$ designs. Time series analysis is generally useless in this case because of the small number of data points in these designs. Although several analysis techniques had been proposed that are claimed to control for the autocorrelation present in series of data in $N = 1$ designs, those techniques do not provide satisfactory solutions. Our research confirms and extends to other statistical tests the results obtained by previous researchers (Sierra, Quera and Solanas, 2000; Solanas, Salafranca and Guardia, 1992; Solanas and Sierra, 1995).

Analytical techniques for simulating and describing social behaviour: Group behaviour and processes are viewed as phenomena that emerge from a simple and small set of interaction rules among agents. Agents are abstract entities that have basic psychological properties and adapt to the environment and to the behaviour of other agents. Specific models are run in an artificial world (Quera, Solanas *et al.*, 2000; Zibetti *et al.*, 2001), and developed until a reasonable fit with empirical data is reached (Quera,

Beltran *et al.*, 2000). Simulation makes it possible to analyze some situations difficult to deal with the real world, and also to uncover unknown phenomena that can be subsequently subjected to empirical test. This approach allows us to understand psychological and sociological mechanisms of social behaviour of human and non-human organisms.

Measuring typicality in scene categorization processes: Typicality is a basic property of both the internal organization of the lexical categories, and scenes. The typicality of a given exemplar is usually measured from its frequency, or from judgments in a Likert scale. Those procedures and analysis were not appropriate for scene categorization. We proposed a procedure to categorize objects present in environmental scenes, bassed on psychometric IRT model. (Beltran, 1990; Beltran and Herrando, 1995; Beltran, Herrando and Pelegrina, 1992; Beltran, Herrando and Salavert, 1998).

Statistical analysis of bioelectric signals: We have investigated spatio-temporal mechanisms underlying lingual activity in speech production (Recasens *et al.*, 1993) and the effect of thalamic lesions on sleep spindles activity (Santamaría *et al.*, 2000). This approach allows us to identify indicators of psychological and physiological processes.

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