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## Research Network on Methodology for the Analysis of Social Interaction

Proceedings of the ninth meeting of MASI

25<sup>th</sup> – 27<sup>th</sup> August 2016



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### IMPRESSUM

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## SESSION 1

### **An overview of recent research involving the t-pattern model and Theme and other milestones from MASI members.**

Gudberg K. Jonsson

T-pattern analysis has been successfully applied in the study of various aspects of human or animal behavior such as behavioral modifications in neuropsychiatric diseases, interaction between human subjects and animal or artificial agents. This presentation will focus on giving an overview of recent research involving the t-pattern model and Theme and other milestones from MASI members.

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### **From stardust and protein cities to swarm intelligence and structured societies: t-patterns in a self-similar fractal world.**

Magnus. S. Magnusson

Mostly a 20th century mathematical phenomenon, Fractals, self-similar patterns of patterns, are pervasive in nature as exemplified by the recently discovered fractal distribution of matter in the universe out to the largest known structures, that is, clusters of clusters of galaxies. From atoms to large structures of molecules such as amino acids to RNA and DNA, most structure in the living world can be described as repetitions of hierarchical self-similar structured

clusters as witnessed, for example, by lung arteries, brains, writing and cities. Also this general kind of structure is again seen in the real-time behavior and interactions of organisms from tiny brain neurons to animals and humans.

Culminating in the structured societies of humans and social insects simpler social phenomena are found in swarms composed by a number of animals that operate in a coordinated fashion without the specialization of individuals characteristic of structured societies.

Human and animal bodies are composed of specialized cells – also called Cell Cities or better, protein cities - making up specialized body parts much as the specialized individuals themselves make up the different functional parts of cities or hives. Thus social structures can be seen as self-similar from the atoms making up the bodies to their cities.

T-patterns are self-similar structured repeated hierarchical clusters that can be considered as a particular kind of statistical pseudo fractals, that is, natural fractals and seem relevant for the discovery, analysis and description of the structure and functioning of numerous natural phenomena in time and, when generalized two or three dimensions, also in space.

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### **T-pattern methodology for human behaviour observation and analysis: Some research applications.**

Ilaria Terrenghi, Barbara Diana, M. Elia, Valentino Zurloni, Annibale Elia, M.S. & Pier Cesare Rivoltella

A basic belief in the field of modern behavioral sciences is that behavior consists of patterns in time. The T-pattern methodology is based on the assumption that complex streams of human behavior have a hidden temporal sequential structure that cannot be fully detected through unaided observation (or with the help of standard statistical and behavior analysis methods). Recurring sequences of behavioral events, usually hard to detect, can be thereby unveiled and carefully described. This kind of analysis has been used in a wide variety of observational studies, including microanalysis of *Drosophila* courtship behavior, cooperative behavior between humans and dogs when constructing an object, complex patterns of neuronal networks' activation. Human behavior patterns include a multitude of everyday events, routines, and processes of work and play (for example, greeting rituals, a lunch, a religious ceremony or a sports match are all patterns).

In this work, we present research results from the application of T-pattern methodology on two different areas: deception detection and soccer performance. We will discuss the suitability of this methodology in observing and analyzing both micro (as facial movements in deceptive interactions) and macro (as ball passages in a soccer match) components of human behavior. We will then present an ongoing research application area for T-pattern methodology that is education and teaching. We will specifically focus on the observation and analysis of teachers' nonverbal behavior during their lessons, aiming to explore if and how this relate to communicative efficacy in terms of

different outcomes of students' learning and engagement.

We will finally discuss some future research directions, which transversally involve the possibility to combine t-pattern methodology with automatic feature extraction tools, motion-capture systems and biofeedback equipment.

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### **Detection of T-Patterns as an important tool for studying changes in psychological interventions from qualitative inputs.**

M. Teresa Anguera, Mariona Portell, Salvador Chacón-Moscoso & Susana Sanduvete-Chaves

The aim of any psychological intervention program is to produce an improvement in the issues, difficulties, or diseases faced by the users/participants. Here we are referring to interventions in which the users/participants remain in their usual context (home, school, work, hobbies, day center, nursing home, etc.) and follow their regular routines with hardly any changes to their everyday lives.

Because of its flexibility, observational methodology can be used in a diverse range of natural contexts in which it is not always possible to apply other methodologies. With direct observation, records of behaviors (which can be more or less systematized) are obtained from video recordings. These records can take various formats that, by itself, are insufficient to evaluate the efficacy of a treatment.

Therefore, researchers need a system that allows them to objectively analyze

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