

## **Kok-Kol Kuan: Artificial intelligence and performance**

*I worked for a while with artificial intelligence scientist Kok-Kong Kuan, exploring the possibilities of interaction – in all sorts of ways – between research into AI and the creative processes of performance work. This is a summary.*

Dynamic form is emerging as a new form of performance practice. It is particularly though not exclusively, associated with physical theatre performance classified as non-narrative, non-literal or non-text-based. This new form of performance is characterised by certain key elements : adaptability, emphasis on interaction between all agents in the creative process; and the notion of emergent rather than pre-planned performance structure. The performers operate as adaptive agents in the emerging process itself as they interact with the material, the people ( each other and the audience ) and the sound environments.

OPTIK exemplifies the nature of this new form of performance practice. OPTIK is a verbally textless movement-based dance performance concerned with a series of loaded moments, each with a potentially limitless variety of spatial and somatic possibilities. What constitutes the performance emerges from the set of initial conditions rather than any pre-planned idea. This demonstrates the dynamic nature of the technique employed by the performers as they work, as well as the interactive nature of the whole process.

Recent advances in information technology, especially artificial intelligence and multimedia are enabling the interactive integration of kinetic art with computers. This new class of robotics is being recognised as autonomous kinetic art sculptures in art galleries, dance concerts and performance arts. They provide means to determine certain effects generated by individuals' responses and explore different choreographic compositions on the computer screen via animation techniques. These systems, usually employing heuristic rules gained from experience, are based on a logic and rational representation art performance.

However in dynamic form performance (as indeed in all live performance arts), this *a priori* fixing of heuristic rules is inappropriate as alternatives, emotions, interpretations (audience and artists), representations, perceptions are all in continuous flux of change. OPTIK's movement-based dance performances for example, focus on the essential dynamics of time, space and human contact, recognising and releasing the energy between the watcher and the watched in a prescribed space at any given time. The performance makes use of a highly developed performative instinct. The dance patterns thus formed are the result of the somatic intelligence of the performers. Dynamic form performance can be seen as a creative search for patterns, wholeness, harmony or cognitive equilibria amongst all the contributory factors. These patterns which are both spatial and temporal cannot be fixed and permanent, but continuously reformulated just as the live performance is constantly organising itself. Dynamic form can be regarded as a continuous organising effort along the critical line between harmony and disharmony. The performers have no resolution to their action given to them in advance, and as a result the performance develops into a complex dynamic system of patterning.

Advances in neuroscience, cognitive science and the associated psychological data support this view. Human thinking and actions involve search for stable patterns among all influencing factors. This is determined by the way human neural networks are structured as a whole - as a spontaneously wired and rewired self organising 'economy' of repeatedly propagated patterns of formulation and reformulation. Viewed in these terms, artificial neural networks may be employed to explore and search for patterns of harmony in the evolution of dynamic form in dance movements.

Artificial neural networks (ANNs) are computational models which attempt to simulate the behaviour of the human brain. An ANN has a parallel distributed architecture of large numbers of simple neuron-like processing elements (nodes) and a large number of weighted connections between the elements. The weights on the connections encode the knowledge of a network. ANNs solve problems by self-learning and self-organisation, deriving their intelligence from the collective behaviour of the nodes. ANNs can recognise, classify, convert and learn patterns. There are now a variety of ANNs which are adept at pattern recognition.

In applying ANNs to dynamic form movement-base dance performance, a suitable ANN model(s) can be used to recognise and learn as well as recognise and classify underlying "factors" contributing to patterns of harmony. Once this is achieved, the ANN(s) can be employed to explore and generate new patterns interactively in real time, hence illuminating the performance as it is experienced.