Summary

The underlying processes of skill learning are complex and practitioners are challenged to explore effective approaches to assist learners in acquiring functional movement skills. By acknowledging that the human body is a complex system, it is pertinent to study human movement behaviour from a nonlinear perspective based on Dynamical Systems Theory (Kelso, 1995; Schöner & Kelso, 1988; Turvey, 1990). From a nonlinear pedagogical approach, the manipulation of instructions as constraints directs learners to search for functional movement solutions and has important implications for teaching and learning. Varying attentional focus instructions (internal and external) as an instructional constraint might influence how learners acquire different movement patterns to achieve specific performance outcomes. The aim of this doctoral research was to examine the effect of attentional focus instructions as a task constraint for skill acquisition from a nonlinear pedagogical perspective. A discrete multi-articular upper limb action (interceptive task) was used as a research vehicle to investigate key research questions.

In Phase 1, the adherence of instructions was determined through the use of a Lexical Decision-making task followed by a questionnaire as manipulation checks. In this phase, 30 novice participants were randomly assigned to three different attentional focus groups (external, internal and control) and instructional cues unique to the groups were presented to them. The derived results indicated that the participants tried to adhere to their provided instructions. Interestingly, the performance scores were comparatively similar across the groups and there was no significant difference in performance scores between the attentional focus groups in this study. A questionnaire was also used as a secondary level of manipulation check and to provide
an indication of the attentional focus preference (external or internal) of the participants in the control group. In this phase, the results from the Lexical Decision-making task provided an indication that the novice participants were trying to adhere to their provided instructions.

In Phase 2, the effect of different attentional focus instructions as task constraints was examined as a function of skill level. As an extension to Phase 1’s work, Phase 2 also examined the adherence of skilled participants by examining the RT taken using the Lexical Decision-making task. All task and procedures were similar to that in Phase 1. In addition, kinematic information of all participants was captured and examined as well. The results showed that the skilled participants were also trying to adhere to their provided instructional cues. A comparison between the skilled and novices showed that the skilled participants under the external and internal groups performed significantly better than the novices in terms of performance scores. Interestingly, the novice participants in the control group managed to achieve comparable results as the skilled participants in the control group. In addition, the preferred movement clusters exhibited by the skilled and novice participants in the control group had similar characteristics to the movement clusters demonstrated by the skilled and novice participants in the external focus group respectively.

Finally, in Phase 3, the emergence of degenerate behaviours as a function of different informational constraints and practice was examined. Phase 3 investigated the performance of 30 novice participants as they underwent a total of 720 practice trials over 6 weeks. These participants were the same in Phase 1. A deeper examination of the movement clusters at the individual level showed a multi-directional pathway of change instead of the suggested pathway of change in terms of degrees of freedom as suggested by Bernstein (1967).