# Influence the Level of Expertise on the Activation of Knowledge Bases in a Sport of Decision Making in Handball (Application of Simulation)

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**ABSTRACT—** ***Various studies on cognitive expertise have developed a new approach to describing the superiority of experts on novices as a benefit of directory knowledge acquired at the heart of practice. This study had as its main objective to confirm the superiority of cognitive performance sports experts. Indeed, the interaction of conceptual knowledge (treatment level) and perceptual knowledge (low-level processing) optimizes performance through a rapid recall and recognition memory knowledge among experts. It does not reach this performance was achieved in the novices. The results confirm that a large repertoire of knowledge acquired through practice facilitates the response to the demands of sporting tasks.***

**Keywords—** Decision making, cognitive expertise; Simulation; Handball

## 1. INTRODUCTION

The purpose of this study was to test the influence of the level of expertise on enabling knowledge base implementation in a decision-making task on static images of game situation simulated attack handball, depending on the complexity of the situation. According Baratgin et all, (2003) activation knowledge base is not the same, different levels of activation require different temporal and cognitive resources, on the other hand the theory of knowledge bases (Chase & Simon, 1973b) argues that the expert is equipped with its own knowledge domain (solutions) ready to use quickly. In contrast, the helpless novice knowledge must treat all information in the situation. Hence the decision time is more important, since it uses more expensive general knowledge about temporal. Following these two assumptions we expect superior performance in the expert in terms of time and relevance of the decision, given its specific knowledge base, rich and accessible than the novice.

To test this hypothesis, we used a forced-choice task (decision) several alternatives (see task), similar to the task used by (Zoudji & Thon, 2003), the level of complexity of the situation is handled by the number of players in the game situation, attackers and defenders involved and the type relevant to the tailback action (keep, pass or shoot for goal) for each situation.

## 2. METHODOLOGY

***2.1. Participants*** : Twelve handball players (mean age: 25 years; σ: ± 3.05 years) participating in the National Handball Championship practicing since more than 12 years age group component "practitioners", twelve coaches (mean: 35 years; σ: ± 5.07 years), graduated from a state certificate 1st, 2nd and 3rd degree, specialty handball in the

group "coaches" and twelve novice subjects (mean age: 25 years; σ: ± 2.90 years) n who has never practiced a collective sport club in the group "novice", the subjects of the three groups of male, volunteered to participate in the experiment. Players and coaches are considered experts therefore they practiced handball competition for over ten years and that this practice is deliberate (Ericsson & Lehmann, 1996). The choice of coaches was justified by their practical and theoretical dual expertise in the business, we believe that their business coach has led them to develop more declarative knowledge of game situations that players.

***2.2. Procedure and equipment:*** Ninety-six handball game situations were selected and randomized in this study. These differ in their level of complexity situations: number of offensive players (A) and human (D) participating in each game situation [4 players (2A against 2D, 5 players (against 3A 2D) 6 players (against 3A and 3D (4A against 2D) 7 players (4A against 3D)] and the type of "action" optimal for the ball carrier (keep, pass and shoot at goal).

***2.3. Task*** : The subject's task is to respond as effectively and as quickly as possible to the appearance of the game situation, indicating what situation he would choose if he was running back (keep, pass, shoot at goal). Each test is conducted as follows: a signal preparation (more) of 1000 ms indicates on an image will appear. This signal is followed by the presentation of the image of the game situation latter remains on the screen until the subject's response. To give its response, the subject must press with one of three fingers on one of the three keys associated with the response. Once the subject responds a plus sign (+) appears for 2500 ms on the screen corresponding to the interval between tests. (See Figure 1)

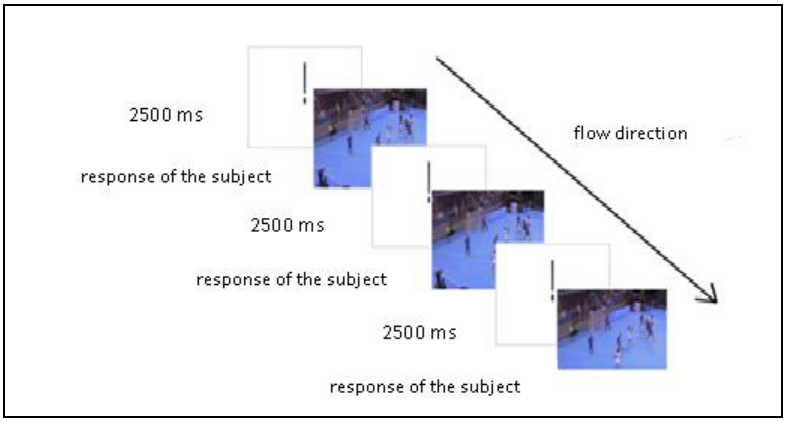



**Fig 1**: Illustration of the procedure for the task of decision making

## 3. RESULTS

The data are processed through multiple analysis of variance (ANOVA). For both dependent variables, response time and pertinence of responses, analysis of variance was performed. The analysis plan includes a factor "group" (3 modalities: novices, practitioners, coaches) and two-factor repeated measures "complexity" (4 ways: 4 players, 5 players, 6 players, 7 players) and "type of action" (3 ways: keep, pass and shoot).

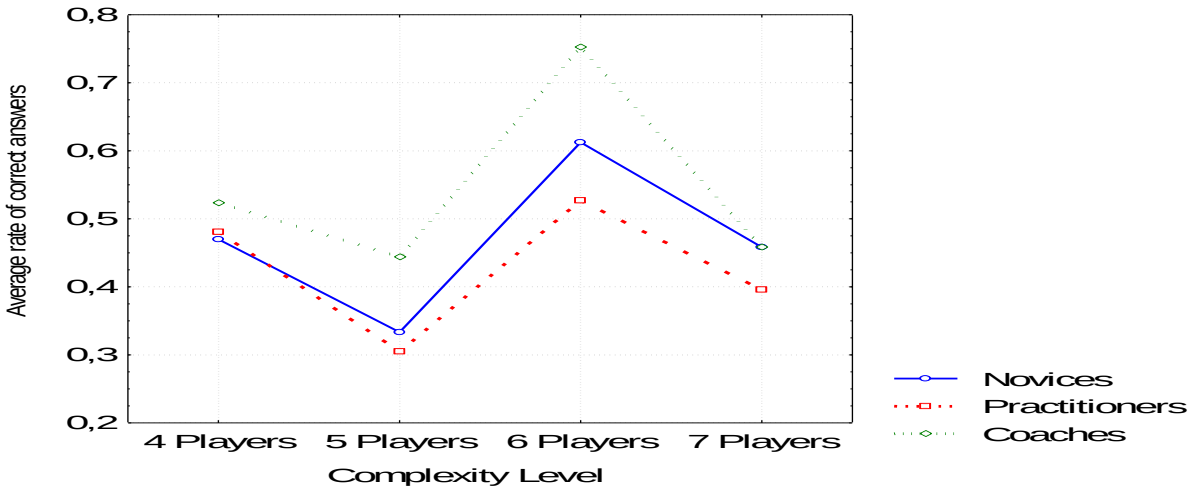
### *3.1. Relevance answers*

At each of the situations presented, is more relevant than the other two action. We recall that the most appropriate action was defined by an independent group of expert coaches who have not participated in the first study. If the subject's response is identical to that action, the score of 1 assigned, otherwise the score is zero. Analysis of variance showed a main effect of "group" of good responses [F (2,33) = 3.77, p <04729]. The post hoc results indicate a significant difference in correct responses between the group of practitioners and novices (p <.00001) and this group and the coaches (p <.001), and finally a significant difference between the group e practitioners and the group of coaches (p <.0001). However, it should be noted that the rate of correct responses in the group of novices exceeds the threshold of chance.

Analysis of variance indicated a main effect of "complexity" [F (3,99) = 5.28, p <, 0020]. The post hoc results showed significant differences in rates of correct responses between situations involving six players and situations involving four players (p <.001). A difference was also observed between situations involving six players and situations involving five players (p <.001). In both cases, the subjects are more efficient when the situation has only 6 players. It is also apparent differences between situations involving six players and situations with 7 players (p <.0001). The other results are not significant, the best performances are recorded for situations involving six players. The worst scores of correct answers correspond to situations involving seven players.

The analysis does not show, however, the interaction between the factors "group" and "complexity". The analysis revealed a main effect of the factor "type of action" [F (2,66) = 20.53, p <, 0000]. The post hoc test showed differences in rate of correct responses between the actions "pass" and "pull" (p <.0001) and "pass" and "keep" (p <.0001), by cons there is no difference between "pull" and. "keep the best performances correspond to action" pass "with an average rate of correct responses of 0.69 (σ: ± 0.24), then the action" pull "with a rate of 0.48 (σ: ± 0.27) Finally, the poor performance was observed in the action "keep" with an average score of 0.43 right answers (σ: ± 0.23.

It should be noted the lack of interaction between the factor "type of action" and the factor "group". However, the factor "type of action interacts with the factor" complexity "[F (6,198) = 5.57, p <, 0000]. The post hoc test showed no significant difference in correct answers on the action "move", whatever the number of players in the situation except for the situation involving four players. For this action, the correct answer rate is highest. Regarding the action "keep" post hoc test showed no significant difference between situations involving 4 players, 5 players and 6 players. However, these three types of situations with significantly different situations with 7 players (p <.01), performance issues are lowest for these situations. Finally for action "pull" the post hoc test showed a significant overall difference between the correct answers situations involving six players and other situations (p <.01). The results indicate better performance for situations involving six players. We did not observe significant differences between the situations with 7 players and situations involving four players against by significant differences between these two situations and situations involving five players (p <.05). The lower performance rates of correct answers are for situations involving five players. (See graph No. 1).




***Graph 1:*** *Average rate of right answers depending on the complexity of the situation and the group.*

In general, one can observe that the rate of correct answers for action "pass" is independent of the complexity of the situation except for situations involving four players. By cons, for action "keep", the correct answer rate tends to decrease with complexity. The same be done for the action "Pull".

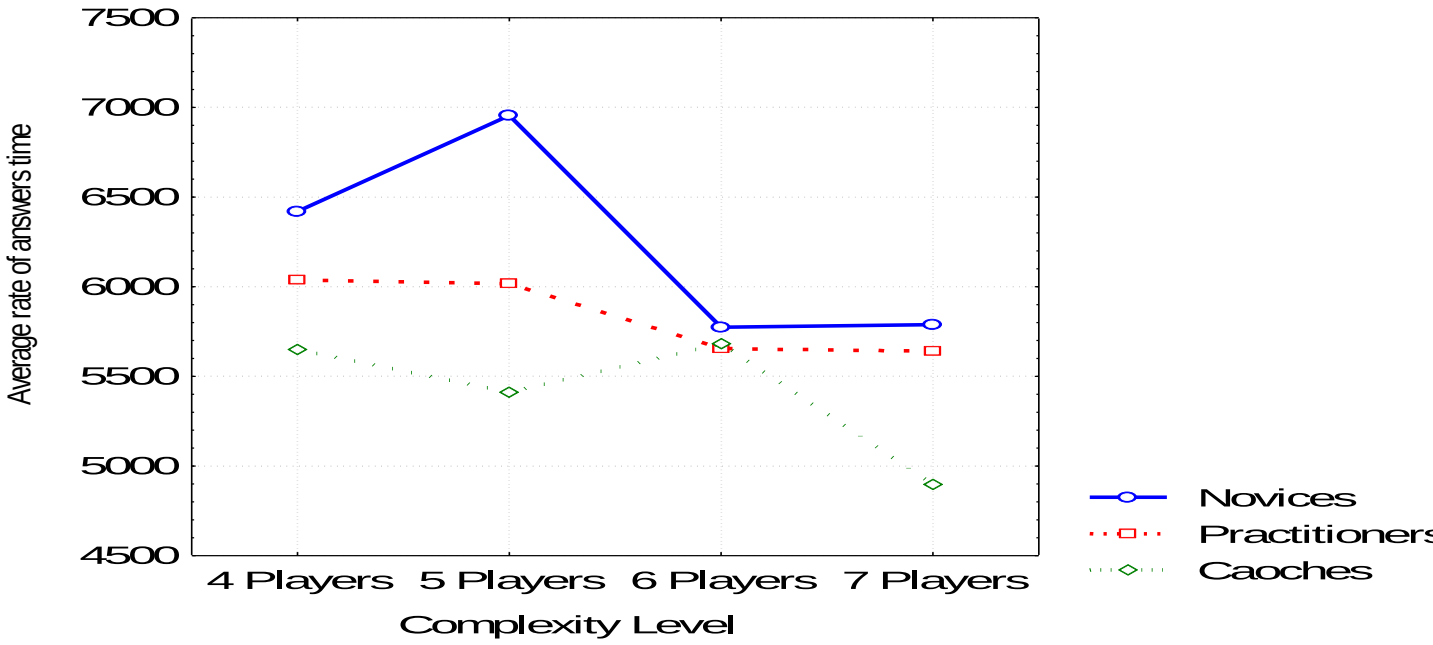
### *3.2. Response Time*

Analysis of variance showed no main effect of the factor "group". However, the average time recorded responses indicate superiority experienced subjects (coaches and Practitioners) to novices.

In contrast, we observe a significant effect of the factor "complexity" [F (3,99) = 3.68, p <, 0017]. The post hoc results revealed significant differences between the situations involving five players and other situations involving simultaneous 4, 6 and 7 players (p <.05). The best performances are recorded for situations involving five players, the lowest performance are listed for all other remaining situations, without differences between these situations.

In general, we observe a tendency to decrease the duration of the response time with the complexity of the game situation. The interaction between the factors "group" and the factor "complexity" is not significant (p <.05). In contrast, the main effect of the factor "type of action" is significant [F (2,66) = 5.42, p <, 0066]. The post hoc test showed differences in response time between actions "pass" and "pull" (p <.001), "go" and "keep" (p <.0001) and "pull" and

"keep" ( p <.001). The Best performance is observed in the action "pass" with an average time of 5009 ms (σ: ± 735) followed by action "pull" (5239 ms; σ: ± 1497). Finally the time the longest answers correspond to action "keep" with an average of 5883 ms (σ: ± 1888). The factor "type of action" factor interacts with the "complexity" [F (6,198) = 2.81, p <.001]. The post hoc test showed no significant difference in mean time of correct answers on the action "move", whatever the number of players present in the situation. For this action, the average time of correct answers are highest. About the action "" pull "the post hoc test showed significant differences between the situations involving players 7 players and other situations, for these past situations times correct answers are the best, other differences are observed ENTERED situations involving six players and situations involving 4 and 5 players, situations involving five players have the lowest scores. (see graph No. 2).




***Graph No. 2:*** *Average response time, in milliseconds, depending on the complexity of the situation and the group.*

## 4. DISCUSSION

The results for the influence of practice handball on enabling knowledge bases show that experts subjects (players and coaches) are more relevant than novices answers. These results are consistent with the hypothesis of knowledge bases assuming the acquisition of specific expert knowledge, rich and structured response to many years of practical knowledge, which allow them to recognize situations (Zoudji & Thon, 2003). These results confirm, however, the results obtained in similar studies (Allard, Graham, & Paarsalu, 1980; Zoudji & Thon, 2003; Baratgin, Ripoll, Courrieu, & Laurent, 2003).

The response times are similar for all three groups of subjects. Thus, the time required for decision making is not influenced by the level of practical subjects. Similar results were also reported by Zoudji & Thon (2003).

The results reveal an influence factor "level of complexity" (number of players involved in the situation) variable relevance and response time. Performance expert topics are best in terms of relevance of responses and especially when they are difficult (large number of players in the situation). On the response time, if at first glance, the time was similar, in some situations the subjects 'behavior is consistent with the hypothesis that time the experts' answers are significantly shorter than those of novices. This is the case of the action "happen." By cons, in situations "pull" and "keep" the three groups perform the same response time.

Equal time scores between experts and novices may be due to the attitude of the player incitatrice rusher in certain situations (the ball carrier shows the action to be implemented). We also think that all subjects, including experts were familiar with the experimental situation; the conditions are far from those encountered in real game situations, which may explain the relatively long response times of the participants.

These results are identical to those obtained in explicit tests of recall or recognition usually explained by the theory of working memory to long-term proposed by (Ericsson & Kintsch, 1995) which posits that expertise on a combination

of information from the domain retrieval cues domain experts. These indices are encoded and stored quickly in long-term memory.

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