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10 So What Do We Do With the Rest of the Day? Going Beyond the Pre-shot Routine in
11 Professional Golf

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14

Abstract

15 Optimally focused attention has been shown to be a key psychological characteristic for peak
16 performance in golf; a feature commonly achieved with a pre-shot routine. However,
17 research to date has yet to address how a golfer's attention should best shift across the
18 broader period of a whole game, or even including pre-event preparations, to support the pre-
19 shot process and, ultimately, performance. Reflecting this knowledge gap, the present review
20 aims to clarify current conceptual understanding and best practice against this wider
21 perspective on attentional control, as well as highlight areas which must be considered for
22 advances to be made. Specifically, research is required on the cognitive, behavioral, and
23 temporal elements of routines used *between* shots and holes. Furthermore, to manage the
24 attentional demands of the entire golf performance experience, such investigation also needs
25 to explore the critical role of the support team and pre-tournament planning.

26

Keywords: preparation, pre-pre-shot routine, post-shot routine, support team

52 voluntary) (Jonides, 1981; Posner, 1980); and content and characteristics (Bernier, Codron,
53 Thienot, & Fournier, 2011). Based on these studies, it can be inferred that high-level golfers
54 should utilize information from visual, kinesthetic, and auditory sources to attend to different
55 attentional foci depending on the situation they face.

56 Perhaps due to the predominant micro (i.e., pre-shot) focus of the literature, work to
57 date has largely failed to address exactly what skilled golfers focus on before and after their
58 swing, and during the considerable gap time which exists in between shots and holes.
59 Moreover, by primarily considering performers' attention immediately preceding or during
60 shot execution, this field of study has also overlooked how the intensity of a golfer's focus
61 may change during an entire round (Hellstrom, 2009). Indeed, important tasks engaged
62 beyond pre-shot and shot levels all require changes in the breadth and direction of attention.
63 These include meso-level information processing before entering a pre-shot routine (e.g.
64 course set-up, ball lie, pin position, wind speed/direction, technical changes made since last
65 facing a similar shot or situation) and the return to meso-processing after shots (i.e., post-shot
66 routine) (Hellstrom, 2009; Thomas, 2001). Taking this requirement against the lack of
67 scholarly knowledge, work is needed which explores what attention should be focused on and
68 how its intensity may change in the time preceding and proceeding shot execution.

69 Anecdotal evidence (cf. Carter, 2013; Scott, 2014; Townsend, 2014) suggests that
70 there a number of potential distractions that professional golfers may face which will require
71 effective meso-level attentional patterning. These distractions will vary in both number and
72 scope, depending upon factors such as: tournament size and importance (e.g. Majors/the
73 Ryder Cup versus a smaller tour event); standing within the tournament (e.g. holding the lead
74 versus chasing the leader); and any tournament specific demands (e.g. the challenging rough
75 at the US Open or the challenging greens at the Masters). The importance of effective
76 attentional patterning at a meso-level was also demonstrated within research by Cohn (1991),

77 who found that peak golf performance was associated with staying in the present, not
78 focusing on past or future events (such as shots that have been hit or a potential score), and
79 having a narrow focus of attention . Anecdotal evidence from players also suggests macro-
80 planning can be used to cope with meso-level attentional demands such as moving on from
81 dropped shots. For example Ogilvy (2012) discussed that part of his preparation for the US
82 Open was using imagery to rehearse how he would react and cope with making more bogies
83 versus a regular tournament.

84 Given that knowing what to focus on and how is essential for peak performance in
85 elite golf (Hellstrom, 2009), especially given the number and scale of possible distractions,
86 the purpose of this paper is threefold. First, we outline current understanding of macro-level
87 (i.e., tournament preparation) and meso-level (i.e., shot preparation and response) planning in
88 golf. Additionally, we also consider how both macro and meso processes may be enhanced
89 via the golfer's work with their support team. Second, and based on existing literature, we
90 discuss and outline current best practice for the patterning of golfers' focus in-between shots
91 and holes. Finally, these preceding considerations are integrated to provide directions on
92 how knowledge gaps in this area may be effectively filled.

93 **Macro- and Meso-Level Planning in Golf: Current Understanding**

94 **Macro (Pre-tournament) Planning**

95 Although McCaffrey and Orlick (1989) outlined the importance of a pre-tournament
96 plan, this key performance feature has remained relatively under-researched in golf. Given
97 that pre-tournament preparation includes a mental plan for course management and shot
98 making strategies, as well as a logistical plan for the management of event requirements and
99 responsibilities (McCaffrey & Orlick, 1989), the comparative dearth of work on this topic is
100 surprising, especially when heeding anecdotal evidence from players (Diaz, 2008; Ogilvy,
101 2012). Additionally, research in other sports has repeatedly highlighted the importance of a

102 structured integration of mental skills and preparative behaviors before competitive
103 performance (Beauchamp, Bray, & Albinson, 2002; Judge, Bell, Bellar, & Wanless, 2011;
104 Malouff, McGee, Halford, & Rooke, 2008.). We now consider some of the most important
105 skills and behaviors which can (and should?) be applied in macro-level planning.

106 **Pre-tournament imagery.** Work from Paivio (1985) has shown that athletes can use
107 imagery to rehearse skills (cognitive-specific imagery) as well as strategies of play and
108 routines (cognitive-general imagery) prior to competition. Additionally, pre-tournament
109 imagery can also serve a specific and general motivational function (Paivio, 1985) where
110 athletes image the achievement of goals (motivational specific: Callow & Hardy, 2001) and
111 also physiological arousal and its effects (motivational general: Hall, Mack, Paivio, &
112 Hausenblas, 1998). Notably, general motivational imagery focused on performance arousal
113 and mastery has been linked to a range of positive outcomes such as self-regulation and self-
114 efficacy (Callow, Hardy, & Hall, 2011; Feltz & Riessinger, 1990; Hecker & Kaczor, 1988;
115 Vadocz, Hall, & Moritz, 1997). Unfortunately, while cognitive and motivational imagery are
116 valuable psychological pre-competition techniques, only Beauchamp, Bray, and Albinson,
117 (2002) have integrated this perspective into golf. The consequent lack of understanding in
118 this area is surprising given the clear anecdotal evidence from elite golfers which supports the
119 use of pre-competition imagery (Ogilvy, 2012). Clearly, such “running through the
120 possibilities” resonates with literature in other sports (cf. Hemery, 1986) and would seem to
121 offer an important tool for pre-tournament preparation in golf.

122 **Pre-tournament technical change/refinement.** Evidence from coaches and players
123 suggests that pre-tournament planning may also effectively include an element of technical
124 change, or at least technical refinement. For instance, Diaz (2008) has previously described
125 how David Leadbetter worked with Trevor Immelman prior to the 2008 Masters tournament
126 to make specific technical changes which would permit better distance control on approach

127 shots to greens; a specific challenge for that particular golf course. From this motoric
128 perspective, sports psychology literature (e.g. Cumming & Hall, 2002) suggests that the use
129 of cognitive-specific imagery could help a player to implement a technical change prior to a
130 tournament due to its functional equivalence with physical practice (Hall, 2001; Holmes &
131 Collins, 2001) and would therefore represent a core planning feature for particular events.

132 **Tactical planning.** Facilitating golfers' pre-tournament imagery and technical
133 change/refinement, as well as being a vital process in its own right, McCaffrey and Orlick
134 (1989) have also earlier suggested that touring professionals hold mental plans for course
135 management and shot-making strategies. As other work has identified that cognitive-general
136 imagery may be used to image these plans and strategies (Paivio, 1985), the implication for
137 golfers and their support teams is that mental models of an established tactical plan should be
138 developed. However, to date, there has been no research addressing how such pre-
139 tournament planning interacts with meso-level in-game thinking, the attentional demands of a
140 round, and how any ad hoc changes in tactics may influence or be influenced by the player's
141 attentional focus.

142 **The Meso Shot Cycle- Planning, Response and Clearing**

143 As it takes less than 5 seconds to address the ball and swing the golf club, and usually
144 less than 45 seconds to plan and execute a shot, Bruce (1998) suggested that a golfer who
145 shoots level par (usually 72 strokes) will be planning shots for 25% of their time and playing
146 shots for 2% of their time on the course. This small percentage of time engaged in the
147 planning and execution of shots clearly leaves large gaps of time in-between shots which
148 golfers can fill with a number of potentially effective strategies. Grounding these strategies in
149 established terminology, the most pertinent are *pre-pre-shot preparation* and a *post-shot*
150 *routine*.

151 **Pre-Pre (Pre²) shot preparation.** Given the role of cognitive and somatic states for
152 the execution of motor skills (Hardy, Jones, & Gould, 1996), there has been a surprising lack
153 of literature on how golfers prepare prior to playing shots. In one of the few exceptions,
154 Kirschenbaum, Owens, and O'Connor (1998) put forth their concept of *Smart Golf* which
155 involves players' use of the acronym PAR: *Plan, Apply* and *React*. Similar to the broad
156 external focus advocated by Nideffer and Sagal (2006), in which a golfer would assess the
157 hole or shot they are about to play, Kirschenbaum et al.'s approach implies that golfers must
158 plan certain elements of their shot *prior* to beginning their pre-shot routine. While the
159 applicability of Smart Golf to elite players can be challenged over its simplicity, these
160 authors' broader suggestion that players should engage in a certain amount of cognitive
161 preparation prior to starting their pre-shot routine is both face-valid and conceptually
162 justified. As noted above, however, we have little understanding of what this process best
163 consists of and how it is best played out in professional golf performance.

164 **Post-shot routine.** It is widely accepted within both sport psychology and golf
165 literature that once a golfer has executed a shot, attention should shift towards evaluation,
166 commonly known as the post-shot routine (Finn, 2009). Specifically, research suggests that a
167 number of behavioral and cognitive characteristics are beneficial for inclusion in this process
168 (cf. Finn, 2009; Kirschenbaum, 1997; Loehr, 1994). In golf, Kirschenbaum (1997) has
169 proposed a "4-F" model to help golfers react positively to poor shots and efficiently transfer
170 focus onto their next effort; a process involving steps of: *Fudge* (an exclamation of
171 dissatisfaction after hitting the bad shot); *Fix* (redoing the swing using a practice swing to
172 correct the problem); *Forget* (forgetting about the problematic shot and remembering that
173 nobody plays perfect golf); and *Focus* (focusing attention on the next shot and in a positive
174 manner). Notably, this post-shot routine resonates with the model of attentional focus
175 proposed by Nideffer and Sagal (2006), which suggests that players should analyze their prior

176 shot before rehearsing the correct movement (if required), and then shift back to a broad
177 external focus ahead of the next shot. However, the idea of the 4-F model as an effective
178 post-shot routine would only seem to be applicable when a player has hit a bad shot;
179 suggestions of what elements should make up a post-shot routine after a good shot have not
180 been forthcoming in the literature.

181 **Enhancing Macro and Meso Routines: Working with the Support Team**

182 Although it is the golfer who executes each shot, practice and evidence suggests that a
183 golfer and their support team – which may include a coach, psychologist, conditioner but
184 most notably the caddie – work together over macro- and meso- level planning processes (cf.
185 Mackenzie, 1997; Reinman, 1999). Drawing on work on Shared Mental Models
186 (Mascarenhas & Smith, 2011) (hereafter SMMs), the team decision making process will
187 logically (or optimally) involve gathering, processing, integrating, and communicating
188 information to arrive at task-relevant decisions. This does not necessarily require that a
189 consensus be reached amongst team members, nor does it suggest that all team members are
190 involved in all aspects of the decision (Mathieu, Goodwin, Heffner, Salas, & Cannon-
191 Bowers, 2000). It does, however, require that each team member processes and filters raw
192 data, applies expertise, communicates relevant information, and (appropriately) makes
193 recommendations to others (Cannon-Bowers, Salas, & Converse, 1993). As well as
194 coordinating and synchronizing their actions with teammates, SMMs also help individuals to
195 predict their colleagues' behavior and needs (Kraiger & Wenzel, 1997; McIntyre & Salas,
196 1995). Recognizing that differences in mental models will result in greater process losses
197 (via the reduction in team coherence), the implication of these points is that members of the
198 golf team (i.e., player and support staff) must hold common and/or overlapping
199 representations of task requirements, procedures, and responsibilities (Mathieu et al., 2000).

200 Of course, team members will not always agree on performance decisions. Indeed,
201 some disagreement would seem essential if decision making is to be optimized (Bowman,
202 1998). Accordingly, Cannon-Bowers et al. (1993) suggested that complex tasks dictate that
203 multiple mental models are shared amongst team members. For elite golf, and to aid optimal
204 decision making processes, the most relevant of these authors' frameworks would appear to
205 be the task, team interaction, and team member models. Task models describe and organize
206 knowledge about how the task is to be best accomplished (e.g., pre-tournament logistical
207 procedures, course management strategies, predicted problems and contingencies). Team
208 interaction models describe the roles and responsibilities of team members, interaction
209 patterns, information flow, communication channels, role interdependencies, and information
210 sources. Finally, team member models contain information which is specific to teammates,
211 such as their knowledge, attitudes, preferences, strengths, weaknesses, and behavioral and
212 emotional tendencies (Cannon-Bower et al., 1993; Mathieu et al., 2000). By addressing and
213 optimizing each of these frameworks, it seems both logical and likely that the focus,
214 functions, and interactions of the golfer and support team will therefore be enhanced. Indeed,
215 and irrespective of the way which such SMMs are linked (e.g., communication processes,
216 strategy, coordinated use of resources: Klimoski & Mohammed, 1994), it is imperative that a
217 golfer is supported by individuals who share his or her performance models and who are also
218 willing to positively disagree at crucial but appropriate moments.

219 Professional tournament golf poses a number of challenges including large periods of
220 time which need to be filled between shots and holes (Bruce, 1998; Lavalley, Bruce &
221 Gorley, 2004), distractions such as crowds and scoreboards, working with a support team
222 before, during, and after performance (Lavalley et al., 2004), and controlling the breadth and
223 direction of attentional focus over the whole performance (Hellstrom, 2009). To date, no
224 studies have clearly addressed strategies used by players and their support team to deal with

250 questions relating to the patterning of focus *during a full round* of golf. For example, while
251 Nideffer and Sagal (2006) propose that a player should start with a broad external focus for
252 assessing the required shot (including wind strength and direction, distance to the flag, and
253 the lie of the ball), what is not explained is *when* this information gathering begins, and *where*
254 this information is gathered from. Notably, Lavallee et al. (2004) state that in some player-
255 caddie relationships, the player merely asks the caddie for the distance to the flag whereas
256 other caddies are far more involved in information gathering and decision making processes.

257 After assessing the shot, and as depicted in Figure 1, the golfer then moves to analyze
258 the possibilities of how to play the shot. Nideffer and Sagal (2006) have stated that thoughts
259 at this stage may include reflections on prior experiences in a similar situation against any
260 changes in technique and equipment which the golfer has since made. Unfortunately, and
261 once again, however, it is not clear where and indeed at what point the player shifts their
262 attention during this process to gather relevant information. Following on from the analysis
263 stage, the player's attention is then proposed to shift to a narrow and internal orientation
264 which supports rehearsal of the technique required to execute the shot effectively (Nideffer &
265 Sagal, 2006). At this stage, responsibility shifts to the player and the caddie can (or should?)
266 no longer have any influence (Lavallee et al., 2004). Finally, and as attentional focus
267 literature suggests (Wulf & Prinz, 2001; Bernier et al., 2011), focus should then shift again to
268 a narrow and external orientation to enable the most efficient execution of the skill (e.g. focus
269 on a small, specific target).

270 Once a golfer has performed a shot, there appears to be a lack of consensus within the
271 literature on exactly what they should then focus on and for how long. Interestingly, and
272 suggesting that focusing for a whole round is not feasible given its lengthy duration, Tiger
273 Woods (2001) has revealed that he allows himself 10 seconds to dwell on a previous poor
274 shot (cf. the Fudge factor mentioned earlier) before focusing on the next shot. Indeed,

300 decrease the attentional demands of a round); (b) the make-up of effective pre-pre and post-
301 shot routines and how these meso-level processes affect shot planning and responses; and (c)
302 how SMMs between the player and support staff affect shot planning and responses.

303 Considering macro-planning first, although the research of McCaffrey and Orlick
304 (1989) outlined the macro-planning processes which elite golfers engage prior to competition,
305 research has not addressed how such preparation may (and should) affect in-game attentional
306 focus and meso-planning. For example, is it possible to remove the need to attend to certain
307 irrelevant and/or detrimental cues while playing with thorough macro-planning? Answering
308 this question through long-term mixed methods tracking studies which collect and triangulate
309 data on pre-tournament planning, in-competition perception, and performance data could
310 positively assist golfers and their supporting practitioners in finding a way to focus on more
311 important, task-relevant cues while playing. Secondly, while post-shot routines have been
312 addressed in prior research (Finn, 2009; Kirschenbaum, 1997) no work has assessed their
313 cognitive, temporal, and behavioral elements in professional golf. Accordingly, exploratory
314 interviews which consider performers' perceptions on each of these factors, including their
315 links with shot outcome and execution of a following pre-shot routine, would prove
316 worthwhile. Additionally, it would also be useful to assess the potential variability in post-
317 shot routines as different shots afford a golfer more time to perform a post-shot routine than
318 others. For example, a golfer who hits his/her tee-shot 250 yards into trees could have well
319 over 5 minutes to reflect on his/her previous shot whereas a player on the putting green may
320 only get 1 minute between his/her ball coming to rest and having to play again. Similar to the
321 proposed merits of different pre-shot routines for different shots (cf. Cotterill et al., 2010),
322 this should also lead researchers to tackle the important question of whether golfers should
323 have different post-shot routines for different shots? For this purpose, action-research based
324 inquiry which builds on the findings from explorative interviews would provide valuable

325 insight into the optimal application of this skill in varying contexts. Furthermore, future
326 research should also outline how systematic and well-practiced shifts in attentional focus
327 within a post-shot routine can be used to aid planning for subsequent shots. To achieve this
328 goal, “think aloud” protocols could be deployed which record and analyze thought processes
329 as golfers move through their entire post-shot routine (Ericcson & Simon, 1993).

330 Finally, we have also outlined the potential importance of SMMs in player-caddie
331 relationships and how this element could impact on shifts in attentional focus with respect to
332 meso-level information gathering. Notably, as previous investigation has tended to focus on
333 the basic structure of caddying and ways to enhance its utility (Lavallee et al., 2004;
334 Mackenzie, 1997), only an unpublished study by Lavallee (1998) has focused on the role that
335 caddies play in maintaining players’ attention and collecting/providing pertinent shot
336 information.

337 While players’ collection of information may simply be a matter of personal
338 preference or experience, a survey of the comparative use of caddies and other strategies, as
339 well as the consequent outcomes which they support, would seem desirable. Furthermore,
340 consideration of which information gathering style to adopt should logically be based on
341 more than personal preference alone. For example, assessing the use of “error taxonomies”
342 to detect the circumstances in which things may work better or worse would also seem
343 merited (e.g. Stanton & Salmon, 2009). This gap needs closing and could be initially
344 achieved though non-participant observation of players and caddies followed by interviews
345 using stimulated recall (Patton, 2002; Lyle, 2003).

346 **Concluding Comments**

347 The ability to effectively regulate attention over the full preparation and execution
348 phases of golfing performance is a critical yet unexplored area. Significantly, as both macro-
349 and meso-level planning processes shape and support in-game cognition, this broadened

350 perspective on the allocation and patterning of attentional control carries significant promise
351 for advancing golf-specific theory and practice. Under this perspective, the investigation of
352 pre-event planning processes, the cognitive, behavioural, and temporal elements of routines
353 *between* shots and holes, and the interactions of a golfer's support team will provide a more
354 rounded and detailed picture of the demands and factors underpinning golfing success. Given
355 the impact which such work could deliver, we encourage researchers to carefully assess,
356 refine, and take up these recommendations as a matter of priority.

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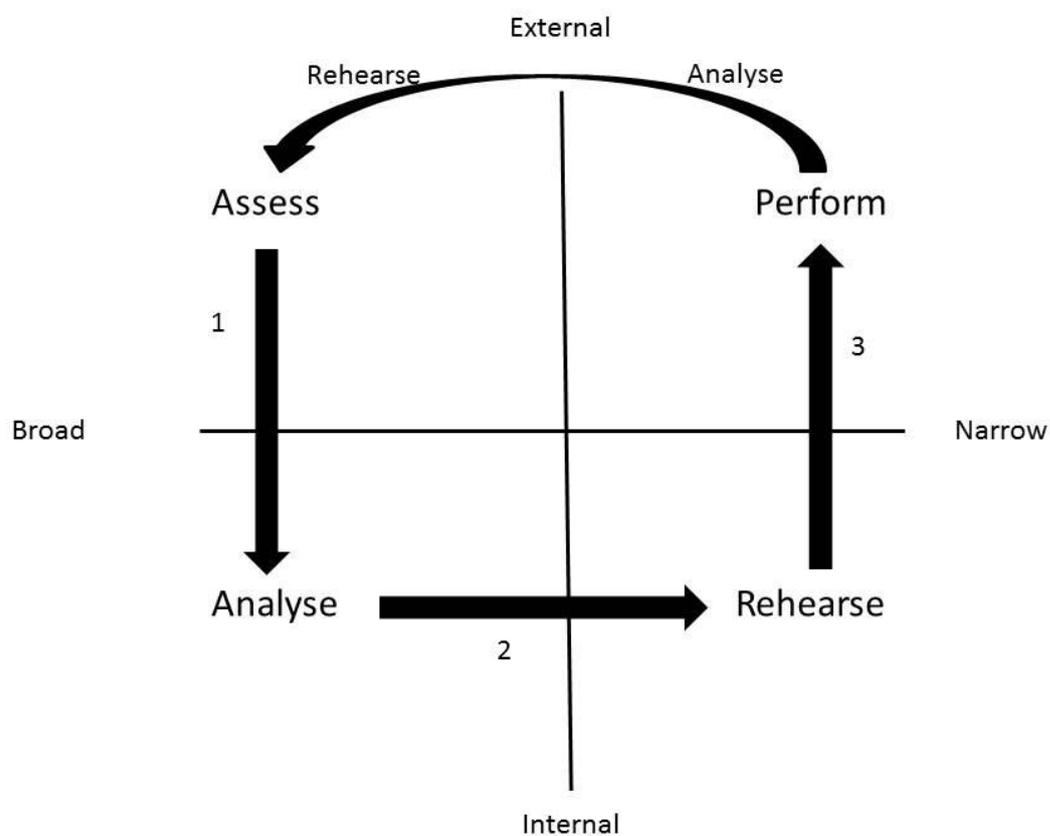
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533 *Figure 1.* A current best practice structure for focus patterning. Adapted from “Dimensions of
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