

## To me, to you: How you say things matters for endurance performance

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1 **Running head:** Grammar and self-talk

2

3 **To me, to you: How you say things matters for endurance performance**

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25

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28

29 **Abstract**

30 Self-talk enhances physical performance. Nothing is known however about the  
31 way that a subtle grammatical difference in self-talk, using first or second person  
32 pronouns, may effect performance. As second person self-talk supports self-  
33 regulation in non-exercise populations, we hypothesized that 10 km cycling time-  
34 trial performance would be superior following second versus first person self-  
35 talk. Using a randomized, counterbalanced, crossover design, sixteen physically  
36 active males ( $M_{age} = 21.99$ ,  $SD = 3.04$  years) completed a familiarization visit  
37 followed by a 10 km time-trial during two separate experimental visits using first  
38 and second person self-talk. A paired  $t$ -test revealed that second person self-talk  
39 generated significantly faster time-trial performance than first person self-talk ( $p$   
40 = .014). This was reflected in a significantly greater power output throughout the  
41 time-trial when using second person self-talk ( $p = .03$ ), despite RPE remaining  
42 similar between conditions ( $p = .75$ ). This is the first evidence that strategically  
43 using grammatical pronouns when implementing self-talk can influence physical  
44 performance providing practitioners with a new aspect to consider when  
45 developing interventions. We discussed findings in the context of a self-  
46 distancing phenomenon induced by the use second person pronouns.

47

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49

50           Relatively recent systematic reviews of this research literature attest to  
51 the positive effects of self-talk on performance, reporting consistent performance  
52 benefits of moderate effect size (Hatzigeorgiadis, Zourbanos, Galanis, &  
53 Theodorakis, 2011; Tod, Hardy, & Oliver, 2011). Furthermore, there is empirical  
54 support that such positive effects hold across different types of tasks; fine motor  
55 skills such as golf putting ( $d = .67$ ), and gross motor skills such as maximal leg  
56 extension tasks ( $d = .26$ ; Hatzigeorgiadis et al.). Within the existent research  
57 literature it is also apparent that different types of phrases said to oneself  
58 moderate any such performance benefits from self-talk (e.g., Theodorakis,  
59 Weinberg, Natsis, Duma, & Kazakas, 2000). Hardy, Tod, and Oliver (2009)  
60 coined this differential expectation the *task demand matching hypothesis* where  
61 instructional self-talk is theorized to be more beneficial than motivational self-  
62 talk for skills involving accuracy, form, and precision; although motivational  
63 self-talk is predicted to be superior to instructional self-talk for gross motor tasks  
64 involving strength and endurance (Theodorakis et al., 2000). Furthermore,  
65 available meta-analytic data offers some empirical support for this hypothesis  
66 (e.g., instructional self-talk – fine task,  $d = .83$  and instructional self-talk – gross  
67 task,  $d = .22$ ; Hatzigeorgiadis et al.). However, within the self-talk literature,  
68 there remains a propensity for researchers to utilize discrete motor skills in their  
69 study designs. Consequently, the inclusion of endurance based experimental  
70 tasks that possess reasonable ecological validity (e.g., a time trial cycle as  
71 opposed to a seated leg extension task) would help to provide practitioners with  
72 firmer evidence based direction.

73           Despite recently introduced perspectives on self-talk (e.g., Van Raalte,  
74 Vincent, & Brewer, 2016) little specific guidance is given with regard to how

75 self-talk ought to influence *endurance* performance. Of note, a number of  
76 relatively recent investigations of self-talk and endurance have drawn from the  
77 psychobiological model of endurance performance (Marcora, 2008) to explain  
78 the reported positive effects. This perspective presents reasoning for the role of  
79 motivational self-talk in human endurance, placing an emphasis on individuals'  
80 perceived effort (RPE). Based on motivational intensity theory (Brehm & Self,  
81 1989), the psychobiological model posits that endurance exercise performance is  
82 driven by effort based conscious decision making. Hence, during a constant  
83 intensity physical task, an individual chooses to stop exercise when they perceive  
84 a very high level of effort (Marcora, 2008), whereas during self-paced time-trial  
85 (TT) exercise an individual consciously regulates their pacing to compensate for  
86 the positive/negative effect of an intervention on perception of effort (De Morree  
87 & Marcora, 2013; Pageaux, 2016). The relevance of Marcora's theorizing is that  
88 any psychological (or physiological) factor affecting an individual's perception  
89 of effort will in turn, influence endurance performance. In the case of self-paced  
90 TT exercise, for interventions that have a positive effect on performance, this  
91 frequently translates as an increase in power output without a change in RPE  
92 (Barwood, Corbett, Wagstaff, McVeigh & Thelwell, 2015; Chambers, Bridge &  
93 Jones, 2009). This is because an increase in power output without an  
94 accompanying increase in perceived effort indirectly suggests that effort  
95 perception has been positively modified in some way.

96         With regard to the use of motivational self-talk said during the execution  
97 of aerobic tasks, it is likely to enable the performer to achieve a more positive  
98 (i.e., confident and motivated) activation state (e.g., Hatzigeorgiadis, Zourbanos,  
99 Goltsios, & Theodorakis, 2008) that in turn, influences his/her perceptions of

100 effort (Gendolla, 2012). Blanchfield, Hardy, de Morree, Staiano and Marcora  
101 (2014) were the first to utilize the psychobiological model of endurance  
102 performance to understand the effects of motivational self-talk. Using a time-to-  
103 exhaustion paradigm, these researchers showed that motivational self-talk  
104 yielded reduced effort perception and enhanced aerobic performance (i.e., 18%  
105 improvement) compared to a control group. When a TT paradigm has been  
106 employed by researchers similarly supportive but not identical findings have  
107 been reported. For example, Barwood et al. (2015) subsequently suggested a  
108 perceptual benefit of motivational self-talk during self-paced TT exercise have  
109 indeed found that motivational self-talk resulted in superior 10 km TT cycling  
110 performance and elevated power output, despite similar RPE compared to neutral  
111 self-talk. The above findings demonstrate that the content of athletes' self-talk is  
112 an important aspect for practitioners designing self-talk interventions to consider.  
113 Nevertheless, other aspects of self-talk have received far less investigation from  
114 sports researchers, yet mainstream psychology research (e.g., Kross et al., 2014)  
115 provides merit for their examination; one of these is *how* self-talk is said.

116         Grammatical aspects of speech have only recently been examined in the  
117 context of self-talk and the motor domain. For instance, Van Raalte et al. (2017)  
118 investigated the impact of interrogative and declarative self-talk; that is, self-talk  
119 phrased as questions or statements, respectively. Contrary to findings reported in  
120 the mainstream literature (e.g., Senay, Albarraci, & Noquchi, 2010) and across  
121 six experiments, no differences between interrogative and declarative self-talk  
122 emerged for motivation, RPE, and performance. One explanation for these null  
123 findings is how the self-talk intervention was conducted. In order to replicate  
124 previous research, Van Raalte et al. employed a pre-task intervention. However,

125 this is largely at odds with traditional sports-oriented motivational self-talk  
126 interventions that place an emphasis on the use of self-talk *during* task execution.  
127         Whether self-talk is said using the first-person (“I can do this”) or the  
128 second-person (“You can do this”) pronoun perspective is another aspect of  
129 grammar that has yet to be investigated within the sports domain. However,  
130 existing research supports the case that using the second-person perspective is  
131 beneficial when the task at hand requires self-regulation (e.g., Dolcos &  
132 Albarracin, 2014; Kross et al., 2014). One reason for this is related to Dolcos and  
133 Albarracin’s supposition that humans become accustomed to directions and  
134 guidance given using non-first person pronouns from significant others (e.g.,  
135 parents, coaches); a process that enables us to integrate societal values and ideals  
136 into our self-system. In-direct support for this habituation explanation comes  
137 from the finding that individuals use more second-person pronouns when making  
138 autonomous decisions involving self-regulation, such as when exercising (e.g.,  
139 Gammage, Hardy, & Hall, 2001; Zell, Warriner & Albarracin, 2012). Kross and  
140 colleagues forward another explanation that overlaps with the St. Clair Gibson  
141 and Foster (2007) “time wedge” concept regarding the role of self-talk during  
142 exercise. That is, self-talk is said to act to separate the self from what he/she is  
143 experiencing. Kross et al. argue that the use of second-person pronouns reflects  
144 the adoption of a broader self-distanced perspective similar to a “fly-on-the-wall”  
145 perspective. Aligned with this theorizing, a number of studies have  
146 operationalized the degree of first-person pronouns present within writings of  
147 emotional experiences as a marker of self-distancing (e.g., Cohn, Mehl, &  
148 Pennebaker, 2004). Attesting to the potential efficacy of second person pronouns,  
149 the concept of self-distancing is also a prominent feature of several

150 psychotherapies and has been referred to as encouraging the “self as context”.  
151 Furthermore, Beck (1970) referred to distancing as a process enabling clients to  
152 think more objectively about their irrational thoughts. Kross et al. (p. 305)  
153 surmised that “the language people use to refer to the self ... may influence self-  
154 distancing, and thus have consequential implications for their ability to regulate  
155 their thoughts, feelings, and behavior under stress”. Indeed, Kross et al. provide  
156 some support for their theorizing that second-person pronouns can encourage  
157 individuals to adopt a more distanced perspective regarding what is going on  
158 around them and as a result cope better than when using the first-person  
159 pronouns.

160           To date, whilst athletes report using both first and second-person  
161 pronouns as part of their self-talk (Hardy, Gammage, & Hall, 2001) and  
162 mainstream psychology evidences the benefit of the second-person perspective  
163 for tasks such as anagrams (Dolcos & Albarracin, 2014) and social speeches  
164 (Kross et al., 2014), experimental comparison of these grammatical features  
165 within the motor domain has not occurred. Consequently, practitioners devising  
166 self-talk interventions would likely benefit from the efforts of applied researchers  
167 attempting to provide guidance on this issue. Drawing on the psychobiological  
168 model of endurance performance and self-talk research using a TT paradigm  
169 (e.g., Barwood et al., 2015), in the present study we examined whether how one  
170 uses self-talk influences performance, work rate, and RPE on a 10 km cycle TT  
171 endurance task. Given that existing literature already offers support that  
172 performers can enhance their endurance via the use of self-talk compared to  
173 control conditions (e.g., Blanchfield et al., 2014), the current investigation  
174 focused on the relative effectiveness of first and second person pronouns. More



175 specifically, we hypothesized that superior TT performance would result from  
176 use of second person pronoun self-talk as opposed to first person self-talk. The  
177 rationale for this prediction stemmed from the self-distancing potential of  
178 second-person pronouns, and that participants would be more receptive to their  
179 self-provided (second-person) advice and encouragement and so work at a higher  
180 intensity, yet would not report differences for RPE (cf. Barwood et al., 2015).

## 181 **Method**

### 182 *Participants*

183 Sixteen recreationally active and healthy males volunteered to take part in  
184 the study ( $M_{\text{age}} = 21.99$ ,  $SD = 3.04$  years old;  $M_{\text{height}} = 181.87\text{cm}$ ,  $SD = 6.99$ ;  
185  $M_{\text{weight}} = 83.34\text{kg}$ ,  $SD = 18.68$ ). Participants self-reported engaging in physical  
186 activity on a regular basis ( $M_{\text{weekly exercise frequency}} = 3.63$ ,  $SD = 1.54$ ;  $M_{\text{weekly exercise}}$   
187  $\text{duration} = 297.50\text{mins}$ ,  $SD = 262.87$ ), competing at university and club levels in  
188 various sports such as rugby, boxing, soccer, Gaelic football, and rock climbing.  
189 All were familiar with high intensity noncycling exercise. Sensitivity calculations  
190 indicated that our sample size was adequate to detect effects comparable with  
191 those reported in the self-talk literature utilising similar tasks (e.g., Blanchfield et  
192 al., 2014); powered at .80 and using a 5% level of significance, we could detect  
193 medium to large sized effects,  $\eta^2 = .37$ ). Ethical approval was granted in  
194 accordance with the formal ethical procedures of the School of Sport, Health and  
195 Exercise Sciences, Bangor University and conformed to the declaration of  
196 Helsinki. All participants were fully informed of the procedures and risks  
197 associated with the research prior to providing written consent to participate in  
198 the investigation.

### 199 *Design*

200 We employed a repeated measures design whereby participants were  
201 randomly counterbalanced after a familiarization visit into either a first-person or  
202 second-person self-talk condition performed in their second visit, with the  
203 opposite form of self-talk employed in their final visit. Dependent variables were  
204 cycling TT performance, average power output, and RPE. Participants completed  
205 a 10 km cycle TT (Wattbike Pro) on each visit.

## 206 *Measures*

207 *RPE:* To measure RPE we used the 11-point CR10 scale developed by  
208 Borg (1998). Low (0.5 = very, very light) and high (10 = maximal) anchors were  
209 established using standard procedures (Borg, 1998). It was also emphasized that  
210 each rating should be based on the effort required to perform the TT as opposed  
211 to any leg muscle pain occurring during the cycling exercise (Blanchfield et al.,  
212 2014).

213 *Average power output:* Average power output (watts) per km was  
214 captured by the Wattbike Expert Software linking information concerning work  
215 performed during the TT on the Wattbike Pro to a laptop.

216 *Performance:* We operationalized performance as the completion time  
217 (seconds) for the 10 km cycle TT.

218 *Mood:* We measured participants' mood via by the UWIST mood  
219 adjective checklist (UMACL; Matthews, Jones, & Chamberlain, 1990). The  
220 UMACL contains eight items describing current feelings and subdivides into a  
221 positive and negative mood subscale. Responses are provided on a 7-point Likert  
222 type scale (1 = *not at all*, 4 = *moderately*, and 7 = *very much*).

223 *Motivation:* We also assessed motivation through the 14 item success and  
224 intrinsic motivation scale (Matthews, Campbell, & Falconer, 2001) comprising

225 two subscales. The success and intrinsic motivation subscales are scored on a 5-  
226 point Likert type scale (0 = *not at all* to 4 = *extremely*).

### 227 ***Procedures***

228 For each visit, participants wore light and comfortable clothing and  
229 refrained from eating within an hour of the TT, consuming alcohol within  
230 twenty-four hours of the TT, performing exhaustive exercise within 48 hours of  
231 the TT, and consuming caffeine or nicotine within three hours of the TT. These  
232 baseline conditions were confirmed by the researcher at the beginning of each  
233 visit to the laboratory. Participants first attended a familiarization visit consisting  
234 of three phases; warm up, TT, and development of self-talk cues. Upon  
235 completion of the relevant forms, height, weight, and bike set-up measurements  
236 were noted, and all participants carried out a standardized warm up, consisting of  
237 a five-minute cycle maintaining approximately 90 watts and 70 revolutions per  
238 minute (resistance on the Wattbike was set at “2” and the magnetic resistance at  
239 “1” for all participants and visits). After completing the warm up, and prior to the  
240 TT, all participants were taught how to use the Borg CR10 scale. To achieve this,  
241 memory anchoring procedures were used whereby participants were instructed  
242 that a rating of 0.5 on the Borg CR10 scale would equate to instances where very  
243 minimal effort was perceived during a physical task, whereas a rating of 10  
244 would correspond to the highest effort ever encountered during a physical task  
245 (Noble & Robertson, 1996; Pageaux, 2016). Participants were then instructed  
246 that after every km, they would be asked “How hard, heavy and strenuous does  
247 the exercise feel?” (Blanchfield et al., 2014), and asked to respond by rating their  
248 effort perception on the Borg CR10 scale. Importantly, following an explanation  
249 of self-talk given prior to the TT, participants were prompted at each km to say

250 aloud statements they had said to themselves during that km of their  
251 familiarization TT, this was recorded verbatim by the experimenter and gave  
252 participants an opportunity to actively contribute to their own interventions.  
253 After completing the TT, participants carried out a 3 minute cool-down.  
254 Participants' naturally occurring self-talk was generally devoid of instructions,  
255 tended to be more motivational in nature but was not overtly negative in content.

256         Similar to previously published self-talk interventions (e.g., Barwood,  
257 Thelwell, & Tipton, 2008), our participants completed a structured workbook in  
258 preparation for the following two experimental TTs involving first and second  
259 person self-talk. Via the workbook we attempted to raise participants' awareness  
260 of their use of self-talk (cf. Hardy, Roberts, & Hardy, 2009) and provided a  
261 mechanism to change any negative self-talk captured during the familiarization  
262 TT into motivational and positive first person and second person self-talk  
263 statements. Consequently, our participants could deploy more functional  
264 statements during their TTs as well as counter any negative self-talk said during  
265 these trials. We also ensured that the new statements were brief and phonetically  
266 simple (Landin, 1994), and viewed by our participants as motivational (Hardy,  
267 Hall, & Alexander, 2001b). For example, if a participant said "This is hurting"  
268 during the familiarization TT, the statement might be transformed into "I can  
269 tolerate this" and "You can tolerate this". Identical to Barwood et al.'s (2015)  
270 effective self-talk intervention for the same TT task, statements were created for  
271 use at the following distances; 0-2 km, 2-4 km, 4-6 km, 6-8 km, and 8-10 km.  
272 See the Appendix for an illustrative example of this process. Overall, participants  
273 provided themselves with encouragement across the five stages of the TT.  
274 However, there was a tendency for participants' self-statements to change from

275 countering their legs hurting (e.g., 4-6km: “I/You can deal with the pain”; “I/You  
276 can keep going”) in the mid-stages, to highlighting the need to work harder (e.g.,  
277 8-10km: “I am/You are going to finish strong”; “I/You can go flat out now”) at  
278 the latter-stages. Approximately 24 hours before each experimental trial, we  
279 emailed participants to confirm their arrival and reminded them about the self-  
280 talk cues they were to use during the upcoming visit. Additionally, as part of  
281 welcoming participants to the laboratory, the experimenter verbally reminded  
282 participants about the self-statements the participants had created and were to use  
283 during the trial. Because of the above features, we guided our participants to  
284 design highly personalized cues, tailored to the task at hand, which according to  
285 Theodorakis et al. (2000) should help to optimize our manipulation. The  
286 workbook and subsequently developed self-talk from the familiarization visit  
287 were retained by the experimenter for later use.

288         Prior to each TT, including the familiarization TT, participants completed  
289 the relevant consent forms, the UMACL, and the success and intrinsic motivation  
290 scale. When the participants returned for their next two experimental TTs  
291 involving ”I” or ”You” forms of self-talk, they performed the same standardized  
292 warm-up as carried out in the familiarization visit. The appropriate list of  
293 developed statements were discussed before and made visible during the TTs on  
294 a computer screen placed (approx. 1m) in front of the participants; participants  
295 were reminded to utilize their personalized statements at the appropriate  
296 distances (Barwood et al., 2015), along with need to rate their perceived effort  
297 every km. During the TT’s all participants silently recited the statements to  
298 themselves, as it is possible that self-talk said out-loud can be awkward and  
299 distracting (Masciana, Van Raalte, Brewer, Branton, & Coughlin, 2001). Gaining

300 active input from our participants in the development of their intervention was  
301 deliberate as this ought to create self-talk statements with personal meaning  
302 (Hardy, 2006), and foster enhanced perceptions of control over the performance  
303 environment (cf. Deci & Ryan, 1985), increasing the effectiveness of the  
304 intervention (Hatzigeorgiadis et al., 2011).

305 Participants were administered a manipulation check after their cool-  
306 down. Example manipulation check items were; “To what extent did you adhere  
307 to the instructions that were given to you before and during the cycling task?”,  
308 “To what extent did your self-talk reflect a first person (i.e., ‘I’ types of  
309 statements) / second-person (i.e., ‘You’ types of statement or included your own  
310 name) perspective?” and “How motivating did you find the self-talk you used  
311 during the time trial?” (cf. Hardy et al., 2001b). There was a period of three to  
312 seven days between each visit to allow sufficient recovery. Participants  
313 performed the experimental TTs at the same time of day as the familiarization  
314 TT.

### 315 *Data Analysis*

316 Data analysis for performance and the manipulation check data were  
317 conducted via paired *t*-tests with the exception of our analysis of possible  
318 ordering effects. As far as RPE and average power output per km were  
319 concerned, 2 (condition) x 10 (distance) fully repeated measures ANOVAs were  
320 calculated. Effect sizes *F*-ratio scores are reported via  $\eta^2$  with values of .10, .25,  
321 and .40 reflective of small, medium, and large effects sizes (Cohen, 1988). For *t*-  
322 tests standardized Cohen’s *d* values were calculated using Equation 11.9 from  
323 Cumming (2012) with thresholds for small, moderate or large effects set at 0.2,  
324 0.5, and 0.8 respectively (Cohen, 1988). Where relevant, 95% confidence

325 intervals are reported throughout to show the plausible upper and lower bound  
326 differences between conditions. In the vast majority of cases, data met the  
327 assumptions underpinning the respective statistical analyses. When this was not  
328 the case, a Greenhouse-Geisser correction was applied to reduce the chances of  
329 committing Type I errors. However, it is worth being mindful that both types of  
330 analyses are robust to moderate violations of their assumptions (e.g., Tabachnick  
331 & Fidel, 2014).

## 332 **Results**

### 333 *Manipulation checks*

334 Descriptive statistics for all study variables are reported in Table 1. Paired  
335 *t*-tests regarding pre-task mood and motivation states confirmed no differences  
336 across conditions: positive mood,  $t(15) = -.35, p = .73, d = .09$ ; negative mood,  
337  $t(15) = .13, p = .90, d = .04$ ; success motivation,  $t(15) = -.41, p = .69, d = .07$ ;  
338 intrinsic motivation,  $t(15) = -.67, p = .51, d = .22$ . In addition, participants' use of  
339 self-talk was as expected, offering support for the integrity of the study's internal  
340 validity. That is, participants reported adhering to their respective instructions  
341 before and during the TT in both conditions,  $t(15) = -.95, p = .36, d = .03$ , and  
342 found their first and second-person self-talk cues equally motivating,  $t(15) = .45,$   
343  $p = .66, d = .14$ , and useful,  $t(15) = .73, p = .48, d = .21$ . Moreover, when in the  
344 first person condition participants used significantly more first person self-talk  
345 than second-person self-talk,  $t(15) = 14.50, p < .001, d = 4.78$ , and vice versa for  
346 the second-person condition,  $t(15) = -13.08, p < .001, d = 4.71$ . Furthermore,  
347 results from a 2 x 2 (self-talk condition x ordering of conditions) mixed model  
348 ANOVA revealed null effects and evidence for the lack of an ordering effect on  
349 TT performance,  $F(1, 14) = 1.88, p = .19, \eta_p^2 = .12$ .

350

\*\*\*\*Table 1 near here\*\*\*\*

351 ***Performance***

352 Results from the paired *t*-test presented support for our main hypothesis.  
353 That is, when participants completed the TT in the second-person self-talk  
354 condition they performed significantly faster ( $M = 1045$ ;  $SD = 95$  seconds) than  
355 when in the first-person self-talk condition ( $M = 1068$ ;  $SD = 104$  seconds), with a  
356 difference between conditions of 2.2%;  $t(15) = 2.77$ ,  $p = .014$ ,  $d = .24$ , 95% CI  
357 [5.37s, 41.38s]. Importantly, on an individual level, 13 of the 16 participants  
358 performed the TT faster in the second person self-talk condition (see Figure 1).

359

\*\*\*\*Figure 1 near here\*\*\*\*

360 ***Average power output***

361 As average power output was captured for each kilometer of the 10km  
362 TT, a 2 (self-talk condition) x 10 (distance) fully repeated ANOVA was  
363 conducted and revealed a main effect for both self-talk condition,  $F(1, 15) =$   
364  $6.08$ ,  $p = .03$ ,  $\eta_p^2 = .29$ , and distance,  $F(1.88, 28.20) = 12.66$ ,  $p < .001$ ,  $\eta_p^2 = .46$ ,  
365 but a nonsignificant interaction,  $F(2.73, 40.89) = 1.16$ ,  $p = .34$ ,  $\eta_p^2 = .07$ .  
366 Participants produced an elevated work rate in the second-person as compared to  
367 the first-person condition (see upper Figure 2).

368 ***RPE***

369 The 2 (self-talk condition) x 10 (distance) repeated measures ANOVA for  
370 RPE indicated a main effect for distance,  $F(1.62, 24.31) = 84.65$ ,  $p < .001$ ,  $\eta_p^2 =$   
371  $.85$ , but neither the effect of self-talk,  $F(1, 15) = .11$ ,  $p = .75$ ,  $\eta_p^2 = .01$ , nor the  
372 interaction,  $F(2.37, 35.60) = .96$ ,  $p = .40$ ,  $\eta_p^2 = .06$ , were significant (see lower  
373 Figure 2).

374

\*\*\*\*Figure 2 near here\*\*\*\*



375

## Discussion

376           The present study is the first to examine the potential benefit of how a  
377 relatively subtle change in *how* athletes speak to themselves using a first-person  
378 or second-person perspective impacts on endurance performance. When using  
379 second-person self-talk, participants completed the 10km cycling TT  
380 significantly quicker, worked harder, yet did not perceive there to be a difference  
381 in effort compared to when completing the task in the first-person self-talk  
382 condition. Collectively, the findings support our a priori hypotheses and for the  
383 first time, illustrate the benefit of considering grammatical features when  
384 constructing self-talk interventions aimed at targeting motor performance.

385           Our significant effect for TT performance offers encouragement for the  
386 potency of this subtle change in the self-talk used by our participants and our  
387 theorizing concerning second person pronouns. When using this more familiar  
388 perspective during an event requiring self-regulation (i.e., second-person  
389 pronouns; Dolcos & Albarracin, 2014), our participants' motivational self-talk  
390 seemed to enable them to work at a higher exercise intensity and affording them  
391 the opportunity to complete the 10km TT faster. Importantly, participants did not  
392 perceive that they had to work harder to achieve these performance related  
393 benefits. This implies that second person self-talk is a more efficient perceptual  
394 strategy (i.e., greater absolute workload for no "cost" in RPE) for endurance  
395 athletes during exercise. This conforms to the tenets of the psychobiological  
396 model of endurance performance (Marcora, 2008) emphasizing the role of  
397 perceptions of effort for endurance.

398           Kross and colleagues (2014) highlight self-distancing as a path through  
399 which second-person pronouns influence our ability to regulate feelings,

400 thoughts, and behavior under stress. Furthermore being able to distance oneself  
401 from a more self-immersed perspective can impact on how individuals process  
402 events and experiences once they have occurred (Kross et al.). For instance,  
403 within the domain of sport this might mean interpreting an error or poor  
404 competition performance more positively. However, to date, the concept of self-  
405 distancing has not been systematically investigated within physical activity  
406 research.

407         Sharing some similarity with Kross et al.'s (2014) self-distancing  
408 mechanism is St. Clair Gibson and Foster's (2007) "time wedge" concept  
409 proposed to underpin the role of self-talk during exercise. This "time wedge"  
410 enables the exerciser to insert time distance between the self and ongoing mental  
411 and physical activities being experienced, facilitating self-observation and  
412 awareness. A second concept related to self-distancing that may occur due to the  
413 use of second-person pronouns is linked to Brick, MacIntyre, and Campbell's  
414 (2014) supposition that self-talk utilized during endurance tasks can be viewed as  
415 a form of attentional focus termed *active self-regulation*. Active self-regulation is  
416 supposed to reflect focus on technique, cadence, pacing, and/or relaxation.  
417 According to Brick et al. a key assertion of active self-regulation is increased  
418 pace without necessarily increased perceptions of effort. Furthermore, an active  
419 self-regulation focus has been theorized to link metacognitive feelings to  
420 metacognitive judgements and estimates (e.g., judgements regarding own  
421 capabilities, estimates of effort) aiding elite runners' cognitive control during  
422 exercise (Brick, MacIntyre, & Campbell, 2015). An alternative explanation for  
423 the current findings involves the influence of pronouns to shape challenge/threat  
424 appraisals (Kross et al., 2014). More specifically, Kross et al. report on the use of

425 pre-task second-person introspection leading to more challenge and less threat  
426 appraisals for an upcoming stressful (public speaking) event. It is possible that  
427 the use of second-person self-talk might promote more facilitative concurrent  
428 appraisals of our demanding TT task; in turn, shaping perceptions of effort (cf.  
429 Gendolla, 2012). Of course, it is only with empirical evidence that fuller  
430 understanding is this mechanistic theorizing will emerge.

431         We hope that the present study represents the first of many self-talk  
432 investigations examining grammatical features of self-talk to reveal instructive  
433 guidance for practitioners. Nevertheless, replication of the current findings is  
434 desirable as is extension to different types of participants. Given that trained  
435 cyclists have more consistent pacing as they are capable of reproducing  
436 performances (De Koning, Bobbert, & Foster, 1999; Barwood et al., 2015) and  
437 have probably developed their own self-talk strategies (Hardy, 2006; Barwood et  
438 al., 2015), it is not a forgone conclusion that the current findings necessarily  
439 apply to this more specialized sample (cf. Hatzigeorgiadis et al., 2011; Tod et al.,  
440 2011). Furthermore, despite our medium to large effect, our difference is less  
441 than the meaningful change of 3.6% that has been reported recently for a 10 km  
442 TT in a sample population similar to ours, albeit using a different cycle  
443 ergometer (Borg et al., 2018). Continued investigation will provide clarity on the  
444 matter. However, self-talk researchers should also explore other aspects of  
445 grammar. Establishing any (performance) differences between perfect and  
446 imperfect verb usage (e.g., Hart & Albarracin, 2009), and between interrogative  
447 and declarative self-talk *when answers are provided to questions* (e.g.,  
448 Puchalska-Wasył, 2014) are alternative candidate aspects of grammar. Also,  
449 differences reported by Son, Jackson, Grove, and Feltz (2011) regarding the use

450 of collectivistic (“we”) and individualistic (“I”) self-talk could form a nuanced  
451 primer for teambuilding interventions.

452         Of greater relevance to the larger topic of self-talk, and central to the idea  
453 of the self, are individual differences. In fact, the current data revealed some  
454 response differences across our participants; while 13 of the 16 participants  
455 displayed superior performance under the second person pronoun condition,  
456 three did not. (Although we reported the individual responses to our intervention,  
457 a novel approach in the self-talk research literature, such personalized detail is  
458 consistent with the practice of sports psychology.) Yet to date investigation of  
459 the interaction of self-talk interventions with aspects of personality is largely  
460 absent (see Thomas & Fogarty, 1997 for an exception). Of particular pertinence  
461 to pronouns is the disposition of narcissism as some data suggest individuals with  
462 narcissistic tendencies use more first-person pronouns than those with less  
463 narcissistic tendencies (Raskin & Shaw, 1988). This propensity to use the first-  
464 person pronouns might make narcissists less likely to exhibit performance  
465 differences across perspectives or as the first person perspective is more central  
466 to them, will make first person pronoun self-talk more effective. However, the  
467 lack of a control condition in the present study and the challenges of  
468 incorporating them in future experiments involving pronouns, might hamper our  
469 ability to fully understanding the exact nature of the interaction between self-talk  
470 and personality.

471         As a result of our novel findings we are cautiously optimistic that they  
472 represent an untapped branch of self-talk worthy of further consideration by  
473 researchers and practitioners alike. Indeed a latent aim of the investigation was to  
474 raise practitioners’ awareness of the potential role of grammar for their practice,

475 highlighting a pocket of research unlikely to have been previously reflected  
476 upon. Inevitably, answers to the above forward-looking research questions would  
477 solidify the reader's confidence in the applicability of grammar to self-talk.

478

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482

483 **Conflict of interest**

484 The authors declare they have no conflict of interest.

485

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631 Table 1. *Manipulation check items and descriptive statistics*

632

	First person self-talk		Second person self-talk		95% CI difference
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
<b>Post-task</b>					
Extent adhered to instructions before and during task <sup>a</sup>	8.44	1.09	8.81	1.38	[-1.22, .47]
Extent that self-talk reflected first person perspective <sup>a</sup>	8.31	1.95	1.38	0.62	[5.91, 7.96]
Extent that self-talk reflected second person perspective <sup>a</sup>	2.06	1.88	9.25	1.06	[-8.36,-6.02]
How motivating was the self-talk that you used during the task? <sup>b</sup>	7.13	1.31	6.94	1.39	[-.71, 1.08]
How useful were the self-talk statements <sup>a</sup>	7.69	1.58	7.31	1.96	[-.72, 1.47]
<b>Pre-task</b>					
Intrinsic motivation <sup>c</sup>	2.94	0.56	3.03	0.47	[-.07, .32]
Success Motivation <sup>c</sup>	2.41	0.64	2.46	0.80	[-.30, .20]
UWIST Positive Mood <sup>d</sup> Subscale	4.64	0.74	4.72	1.00	[-.55, .40]
UWIST Negative Mood <sup>d</sup> Subscale	1.64	0.77	1.61	0.78	[-.49, .55]

633

634 *Note:* Values are the mean of reported scores on response scales of: <sup>a</sup>(1-10); <sup>b</sup>(1-

635 9); <sup>c</sup>(1-5); <sup>d</sup>(1-7).

636

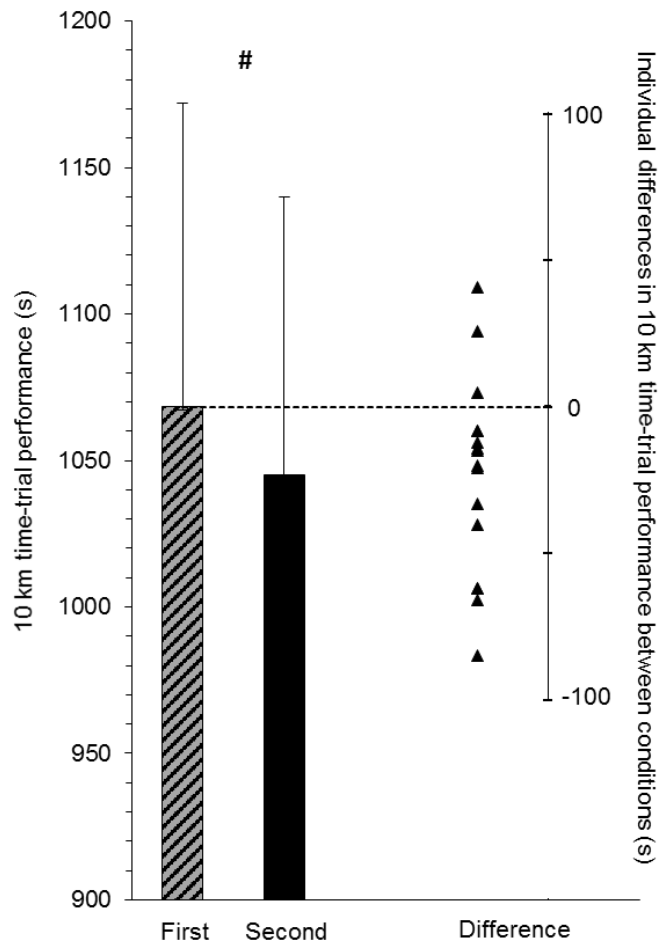
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640 **Figure Captions**

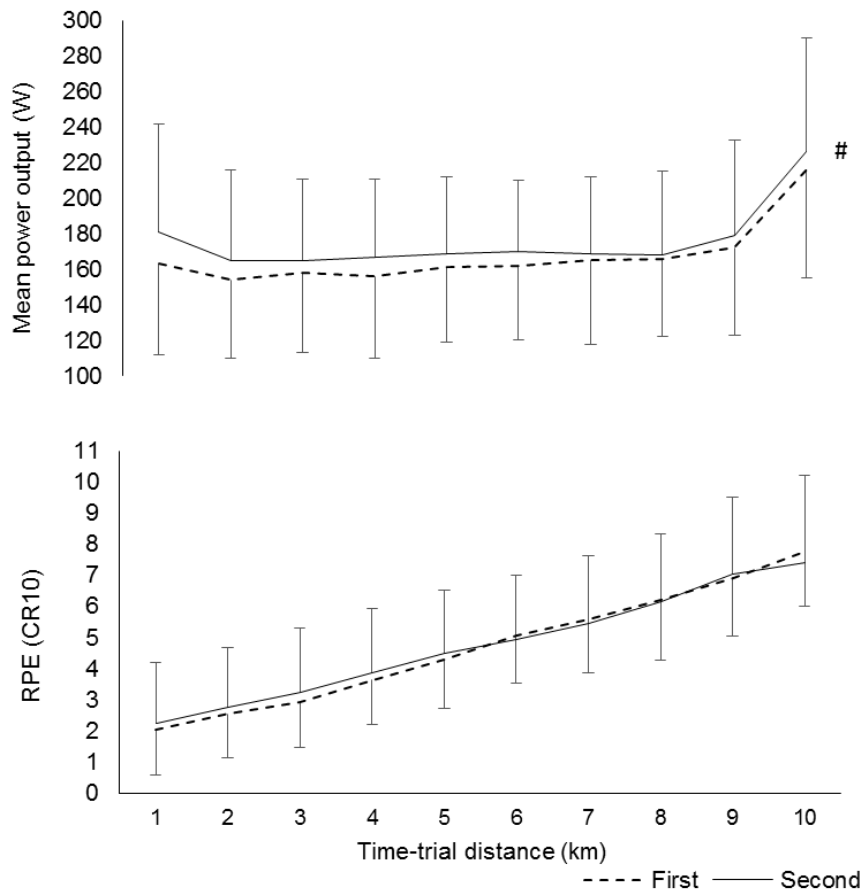
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642

643 Figure 1. Mean and standard deviation 10 km cycling time-trial performance  
644 following use of first and second person self-talk during exercise. Triangles on  
645 floating secondary y-axis denote individual differences between conditions.

646 #Denotes significantly different 10km time-trial performance.



647

648

649 Figure 2. Mean and standard deviation power output for first and second person  
 650 self-talk at 1 km intervals throughout 10 km time-trial (upper figure) and RPE for  
 651 first and second person self-talk at 1 km intervals throughout 10 km time-trial  
 652 (lower figure). # Denotes significant difference between conditions.

653

**Appendix**

654 Illustrative examples of two participants' self-talk captured and then altered for

655 each stage of the 10km TT.

<i>Km</i>	<i>Self-talk said in familiarisation TT</i>	<i>Changed to "I" pronouns</i>	<i>Changed to "You" pronouns</i>
<i>Participant A</i>			
0-2km	C'mon Keep pushing	I can do this	You can do this
2-4km	C'mon Keep pushing Keep it smooth	I can do this	You can do this
4-6km	Keep grinding Keep pushing Almost there	I'm halfway through, almost there	You're halfway through, almost there
6-8km	Keep grinding Keep pushing Almost there Hang in there Keep your leg speed	I'm hanging in well	You're hanging in well
8-10km	Keep digging in Forget about the pain Almost there Keep picking up the leg speed	I can keep going	You can keep going



<i>Participant B</i>			
0-2km	I can do it It's going well	I can do it	You can do it
2-4km	I am determined Feeling motivated	I'm determined	You're determined
4-6km	I'm halfway there I need to keep going	I can keep going	You can keep going
6-8km	No pain, no gain C'mon, I'm nearly there	I can work through the pain	You can work through the pain
8-10km	Last push now I've done it	I will succeed	You will succeed

656