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Self-Talk and Gross Motor Skill Performance: An Experimental Approach?

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ABSTRACT

The purpose of the study was to examine the effects of instructional and motivational self-talk on the performance of a sit-up task. Previous research has found a lack of performance differences between these two self-talk groups and a control group. Motivational interpretations of self-talk and self-efficacy are two mechanisms that may account for this result and so these two mechanisms were assessed in the present study. Forty-four undergraduates completed a modified crunch test on three occasions. Inspection of the manipulation check surveys revealed that a priori treatment groups were not obtained. Thus, the original experimental design was not possible. Subsequent post-hoc correlational analyses indicated that both self-talk dimensions were positively related to self-efficacy, self-efficacy was positively associated with performance, but neither self-talk dimension was related to performance. The implications of these results for experimenters and practitioners were discussed.

Introduction

Researchers interested in self-talk have almost exclusively focused on its relationship with (sporting) performance. The employment of instructionally based self-talk (e.g. Harvey, Van Raalte, & Brewer, 2002; Landin & Hebert, 1999; Mallet & Hanrahan, 1997; Perkos, Theodorakis, & Chroni, 2002; Theodorakis et al., 2000; Van Raalte, Brewer, Rivera, & Petitpas, 1994; Van Raalte, Cornelius, Brewer, & Hatton, 2000) as well as positively phrased self-talk (e.g. Van Raalte et al., 1995; Van Raalte, Brewer, Rivera, & Petitpas, 1994; Van Raalte, Cornelius, Brewer, & Hatton, 2000) has led to enhanced performance. Although numerous studies support the use of self-talk as a performance enhancing strategy, few investigations have examined the theoretical

mechanisms for how and why self-talk may enhance performance. One reason for this lack of understanding is that possible mechanisms that might explain performance increases have not been investigated.

One aspect of self-talk that may explain the self-talk—performance relationship is its functional quality (Hardy, Gammage, & Hall, 2001a). Two broad functions of self-talk exist; instructional (cognitive) and motivational. In a series of four studies, Theodorakis et al. (2000) examined the general hypothesis that performance gains would be expected when the type of self-talk employed by an individual matched task demands. Thus, instructional self-talk focusing on the technical aspects of performance was expected to be more effective than motivational self-talk when the task demands included skill, timing, and accuracy. Conversely, the beneficial effects (e.g. increased energy, arousal, drive, confidence, focus, and effort) of motivational self-talk were expected to enhance performance over instructional self-talk when task demands focused on strength and stamina. Although support for their first prediction was generated (Studies 1 & 2), support for their second expectation was lacking (Studies 3 & 4). Moreover, while both instructional and motivational self-talk treatments led to increased performance over a control group on a maximal leg extension task (Study 4), no differences were found between these three groups on an endurance based sit-up task (Study 3).

Explanations for the lack of performance differences between self-talk groups include: (a) females and males may have been unequally distributed across the groups, (b) data collection may have occurred in groups, allowing social comparison to take place, and (c) the verbal cues—"breathe out" (instructional cue) and "I can" (motivational cue)—utilized in their study were relatively basic, unpracticed and un-customized (Theodorakis et al., 2000). As a result, Theodorakis et al. suggested the examination of the effects of individualized, meaningful self-talk as an area of future self-talk research.

Another area of future research proposed by Theodorakis et al. (2000) was the need to investigate the reasons why self-talk may impact on performance. Hatzigeorgiadis, Theodorakis, and Zourbanos (2004) reported preliminary evidence that self-talk may work through a reduction in the number of interfering thoughts during the learning of water-polo throwing tasks. It has also been suggested that self-talk may assist athletes' self-confidence and anxiety control (Hardy, Jones, & Gould, 1996). Furthermore, a meta-analysis by Woodman and Hardy (2003) demonstrated the both self-confidence and anxiety significantly impacted on sporting performance. According to Feltz and Chase (1998), there is substantial theoretical overlap between self-confidence and the term, self-efficacy (Bandura, 1997). Self-efficacy is commonly viewed as a situation specific variation of self-confidence and has repeatedly been found to be positively related to sporting performance (see Moritz, Feltz, Fahrbach, & Mack, 2000 for a review). Given Bandura's (1997) conceptualization of self-efficacy, a relationship between self-talk and self-efficacy could be expected to exist. That is, according to Bandura there are four sources of self-efficacy: performance accomplishment, vicarious experience, verbal persuasion, and emotional arousal. One form of verbal persuasion can originate from the self in the form of an individual's self-talk. Although not the most potent source of efficacious beliefs, it would be predicted that the more positive the verbal persuasion (and self-talk) the greater the impact on efficacious beliefs, especially when in challenging situations. The examination of the theoretical concept of self-efficacy would compliment Conroy and Metzler's (2004) work, which applied

personality theory to the study of self-talk.

Another mechanism responsible for the effect of self-talk on gross motor skill performance may be the individual's motivational interpretation of their self-talk. One aspect of an individual's interpretation of their self-talk is its directional interpretation. That is, the content of an individual's self-talk may be viewed by that individual as being motivating or de-motivating (Hardy, Hall, & Alexander, 2001b). If an individual did not interpret their self-talk as being motivating, one could not reasonably expect that content of self-talk to generate motivating effects, and ultimately enhanced gross motor performance. Furthermore, as suggested by Theodorakis et al. (2000) it may be that (assigned) instructional self-talk can also serve motivational functions. As a result, participants' directional interpretation of self-talk could be another explanation for Study 3's lack of differences across groups. Directional interpretation of self-talk has been operationally defined by one dimension of the Self-Talk Grid (Hardy et al., 2001b) that measures self-talk valence (positive—negative self-talk), as well as the directional interpretation of self-talk (motivating—de-motivating).

Clearly, a few limitations are associated with Theodorakis et al.'s (2000) examination of the effect of self-talk on sit-up performance. Consequently the general aim of the present investigation was to extend their study to more fully understand the effects of self-talk on performance. The purpose of the present study was to control for the effects of unequal sex distribution across groups and for social comparison, as well as examine the effects of two underpinning mechanisms (self-efficacy and directional interpretation of self-talk) and the effects of individualized self-talk on the performance of a stringent sit-up task. Thus, although the general protocol was replicated, a number of alterations were made to Theodorakis et al.'s original study design. These extensions included: (a) only females were recruited for the present experiment, (b) performance of the sit-up task was carried out in relative isolation (i.e., only participant and examiner present), (c) measures of self-efficacy and directional interpretation were administered, and (d) an additional (individualized) condition group was created. In all, four experimental groups were employed—instructional self-talk ("breathe out"), assigned ("I can") motivational self-talk, self-determined motivational self-talk, and control (no self-talk instructions)—and four hypotheses were forwarded. First, because of the task demands of an endurance based sit-up task, it was expected that the motivational self-talk groups would outperform the instructional self-talk group and control group. Second, as participants in a self-determined motivational self-talk group would be able to customize their verbal cues, it was predicted that this group would perform best. Third, due to the tasks' lack of technical demands, members of the two motivational self-talk groups would be more self-efficacious than the instructional self-talk group and control group. Fourth, as the two motivational self-talk groups employed self-talk that was supposed to be motivating, it was expected that these two groups would have the highest motivating interpretation of their self-talk.

Method

Participants

Forty-four female healthy undergraduate students (M_{age} = 21.66 years, SD = 1.46) volunteered for the present study. The majority of the sample were white, majoring in

Kinesiology and regular exercisers who exercised approximately three times a week (including weight training). Consequently, the gross motor skill task performed by the participants in the present study was not a novel one. Participants were not financially reimbursed for their participation. <|P>*Procedure and experimental design*

Participants volunteered to be in the study. Written informed consent was obtained from each participant after he/she had read a letter of information and had any questions answered satisfactorily.

In order to maintain the internal validity of the study a single-blind randomly controlled experimental design was utilized. That is, investigators were blind to participants' treatments. Each participant completed three trials; one week separated each trial. Participants' trials were conducted in a laboratory, accompanied only by an investigator. Each trial consisted of an explanation of the expectations for the participant, a brief warm-up period, the completion of self-efficacy questions, performance of a crunch sit-up task, and finally the completion of self-talk/manipulation check questions when appropriate. To prevent the promotion of the use of self-talk by the control group, this group only completed manipulation check questions after Trial 3. Trial 1 was the baseline trial. Upon completion of the first trial participants were randomly assigned to one of the four experimental groups. The remaining two trials were intervention trials. To maintain the integrity of the blinding process, participants assigned to the self-talk groups were instructed to use covert self-talk only (i.e., self-talk said internally so that only the participant knows what is said).

Task

For each trial participants were given the instruction to "do their best" on an endurance-based modified crunch test (cf. Canadian Physical Activity Fitness and Lifestyle Appraisal; Canadian Society for Exercise Physiology, 1996). Participants were required to perform crunches at a fixed rate (50 b.p.m.). The rate of which was indicated by beats of a Korg MA-20 digital metronome. Participants started from a supine position on a gym mat whereby shoulder blades, feet, and hands were in contact with the floor. Arms were relaxed but straight and parallel to the trunk. Knees were required to be at an angle of 90 degrees. Middle finger tips touched a raised line that marked the end of the 'down' phase of the crunch; 10 cm from the starting or 'down' line was a second line signifying the end of the 'up' phase of the crunch. As a result, fingertips and palms were pushed along the floor until the fingertips came in contact with the 'up' raised line. Trials were terminated in one of three ways: (a) participants could stop on their own accord as they were fatigued and could no longer continue, (b) participants were no longer able to keep up with the cadence of the metronome, (c) participants were unable to maintain proper form (e.g., feet came off the floor).

Treatment conditions

Instructions given to participants assigned to the instructional self-talk, motivational self-talk, and control groups were identical to those employed in Theodorakis et al.'s (2001) Study 3. Instructional and motivational self-talk group members were asked to repeat "breath out" and "I can" respectively. Conversely, the control group was instructed to "do their best". So as not to

prime the control group to utilize self-talk, members of this group answered questions relating to self-talk after completion of Trial 3 only. The fourth group was novel to the present investigation. Members of this self-talk group generated and recorded one or two phrases (ideally 1 or 2 words long and no more than 4 words long) that would be motivating during the task. It was suggested that they might have previously used their phrases in other difficult situations. Restrictions on the number and length of the phrases were given in order to avoid execution (e.g., co-ordination) problems that have been suggested to be relevant to self-talk interventions (Landin, 1994). In order to reduce the possible confounding effects of goal setting, participants were not informed of their performance (no. of seconds able to perform task).

Instruments

Self-talk. Self-talk was measured using the Self-Talk Grid (Hardy et al., 2001b). The Self-Talk Grid assesses two dimensions of self-talk via two single items responded to simultaneously on a 9-point scale in a grid format. That is, the participant places a check mark in only one square. The self-talk valence dimension is anchored by *extremely negative* (1) and *extremely positive* (9) whereas, the directional interpretation of an individual's self-talk is anchored by *extremely de-motivating* (1) and *extremely motivating* (9). Support for the instruments convergent and construct validity has been provided. Hardy et al. (2001b) found a weak positive relationship between self-talk valence and the hedonic tone dimension of affect in both competition and practice settings (partial *r*s = .35 and .25, respectively). Moreover, the directional interpretation of self-talk was found to be positively related to the intensity dimension of affect (partial *r*s = .31 and .50 for the practice and competition settings respectively). The two self-talk dimensions were also positively correlated to each other (partial *r*s = .23 and .24 for the practice and competition settings, respectively). Furthermore, athletes interpreted the content of their self-talk as being more motivating prior to competition than before practice.

Self-efficacy. Due to the simplistic nature of the sit-up task, participants responded to two task-specific single items; (a) how confident are you in your ability to carry out the sit-up task, and (b) how confident are you that you will do well on the task? For both items a zero (*not at all confident*) to 100 (*extremely confident*) response scale was employed whereby participants circled a 10-unit increment. Completion of the self-efficacy items took place after participants had been given their assigned instruction and prior to execution of the task. Because the correlation between the two items exceeded .70 (Tabachnick & Fidell, 2001), an average of the items was computed and employed in the analyses so as to avoid problems with multicollinearity. Bandura's (1997) concept of *level* of self-efficacy (e.g. confidence in one's ability to carry out the sit-up task for 30 seconds, 1 minute or 1 min and 30 seconds?) was not measured so as to reduce the potentially confounding effects of goal setting.

Manipulation check. In order to ascertain if the proposed self-talk manipulation was successful, participants completed several self-talk related questions after Trials 2 and 3. The post-manipulation check survey also contained the Self-Talk Grid. Participants were asked with a 'yes' or 'no' format, "Did you say anything to yourself during your sit-up session?" followed by an open ended item (If yes, what did you say to yourself?) which allowed participants to list the content of their self-talk. This was followed by a general assessment of the frequency of self-talk used (How frequently did you say things to yourself?) via a 9-point scale (1 = *never*, 9 = *all the*

time). Participants also responded to questions pertaining to how self-determined and how meaningful they found their self-statements as well as if they had encountered any problems coordinating their self-talk while performing the task (1 = *not at all*, 5 = *extremely*).

Results

Phase 1: Post-manipulation check

Participants' reported self-talk was independently classified by two raters into instructional, "I can" motivational, other motivational and miscellaneous self-talk categories. Although initial analysis indicated 87.5% inter-rater agreement, consensus was reached following brief discussion between the two coders. Findings from the open-ended question indicated that although almost all participants performed their respective self-talk treatment statements, they also employed additional self-talk akin to other self-talk groups' treatment statements (see Table 1). For example, although every participant assigned to the instructional self-talk group employed their designated verbal cue "breath out", just over half the group also employed self-talk that was extremely similar to the self-talk utilized by the self-determined motivational self-talk treatment group (e.g., "you can do it", "come on!", "this is easy"). An identical picture emerged for the "I can" motivational self-talk treatment group's use of self-talk. Furthermore, nearly the entire control group employed one form or a combination of the forms of self-talk under investigation. Consequently, the a priori groups were not generated. Thus, although sound measures of the two proposed mechanisms of a self-talk—performance relationship, as well as performance itself were obtained, there was a failure to manipulate the independent variable as intended. As a result, this discounted the use of a between group statistical analysis and the testing of the a priori hypotheses.

Table 1. Post-manipulation Check Breakdown of the Forms of Self-talk Employed during the Task

A priori group assignment	*N* assigned to treatment condition	*N* reporting instructional self-talk	*N* reported saying "I can" [a]	*N* reporting additional motivational self-talk	*N* reporting miscellaneous self-talk [b]	*N* reporting not using self-talk
Instructional self-talk	11	11	0	6	5	0
Motivational self-talk	12	1	12	10	0	0
Self-determined self-talk	10	1	1	9	3	0
Control	11	2	0	6	4	2

Notes. It should be pointed out that as it is possible for individuals to employ more than one form of self-talk during the completion of the task, numbers across rows for reported self-talk use do not necessarily sum to the original *N* assigned to that particular treatment condition group.

[a] signifies that "I can" was the treatment condition for the motivational self-talk group.
[b] Examples of miscellaneous self-talk include "focus" and the counting of the number of sit-ups completed.

Phase 2: Post-hoc correlational analyses

Given that the self-talk literature has not previously addressed the potential mechanisms (i.e., self-efficacy and directional interpretation of self-talk) underpinning the self-talk—performance relationship, post-hoc correlational and regression analyses focusing on this issue were feasible and consequently conducted. Moreover, as directional interpretation of self-talk was measured simultaneously with self-talk valence, it was deemed prudent to include the latter self-talk variable in the analysis. Consequently, data relevant to Trial 3 were pooled. This was because the control group had not completed self-talk related questions at Trial 2. Furthermore, incomplete data were collected from two control group members as they reported the absence of self-talk during Trial 3. These individuals were subsequently removed leaving a sample size of 42.

From a descriptive standpoint, participants carried out the task for approximately 2 minutes (M = 133.21sec, SD = 85.53), reported being quite self-efficacious (M = 77.89%, SD = 14.02), using self-talk that was quite positive in nature (M = 6.79, SD = 1.24), and using self-talk fairly often (M = 6.42, SD = 1.48). Individuals interpreted their self-talk as being motivating for

themselves (M = 6.98, SD = 1.05). Furthermore, the participants reported that their self-talk was quite self-determined (M = 3.55, SD = 1.04) and meaningful (M = 3.34, SD =.84), and that they had no real problems coordinating their self-talk while performing the task (M = 1.74, SD =.91).

In order to examine the relationship between self-efficacy, self-talk valence, directional interpretation of self-talk, and performance, correlational and regression analyses were conducted. Zero-order and second-order partial correlations were calculated primarily to understand the association between the proposed predictors of performance—self-efficacy and the two self-talk variables. Although self-talk was moderately and positively associated with self-efficacy, self-talk valence had a stronger relationship to self-efficacy than directional interpretation of self-talk (r = .49, p < .001, pr = .42, p < .01 vs. r = .35, p < .05, pr = .05, p = n.s., respectively).

As the aim of the present study revolved around performance, a two block hierarchical regression analysis was conducted in order to examine self-talk's and self-efficacy's relationship to sit-up performance. In addition, as the investigation's primary objective was to examine self-talk's effect on performance, self-efficacy was entered into the regression equation at block 1 so as to control for its influence on performance. Block 2 was comprised of the two self-talk predictors. Due to a lack of rationale for a specific order of entry for these two predictors, a "model-building rather than model-testing" (Tabachnick & Fidell, 2001, p. 138) stepwise entry procedure was employed for the second block of predictors as it was thought that findings from such a procedure would assist future self-talk research. Results from the hierarchical regression indicated that although self-efficacy significantly predicted performance, R^2_{adj} = .09, F (1, 40) = 4.75, p < .05, entry of the block of self-talk predictors did not significantly predict performance over and above the amount of variance already accounted for by Block 1. Thus, it would seem that although one of the proposed mechanisms of the self-talk—performance relationship, self-efficacy was related to performance, neither directional interpretation of self-talk (the other proposed mechanism) or self-talk valence were associated with performance.

Discussion

The overall purpose of this study was to examine the self-talk—performance relationship and in particular the validity of two underpinning mechanisms for the effects of self-talk on performance. Inspection of post-manipulation check surveys indicated however, that a priori hypotheses could not be examined as the four experimental groups were not created. Post-hoc correlation and regression analyses revealed that although self-efficacy was positively related to sit-up performance, self-talk (directional interpretation and valence) was not. Furthermore, self-talk was positively related to self-efficacy.

Findings from the present study highlight the importance of utilizing sufficiently detailed post-manipulation check procedures so as to accurately inform investigators of their manipulation attempts. The post-manipulation check protocol employed in the present study indicated that although treatment group members generally behaved as intended (i.e. they used their self-talk cues), they also employed additional self-talk. This in turn meant that a priori treatment groups were not created. This finding is contrary to the self-talk literature (e.g. Perkos et al., 2002; Theodorakis et al., 2000, Studies 1-4; Van Raalte et al., 1995) but is in line with the findings of a

motor imagery and verbal cue study by Hall, Moore, Annett, and Rodgers (1997). Fortunately, Hall and colleagues were still able to examine a limited number of their original hypotheses through the creation of post-hoc groups. An explanation for the present study's manipulation findings is warranted, however.

Previously employed check protocols have typically asked participants how frequently they employed their assigned verbal cue. Researchers have taken frequent usage as support for the generation of their desired treatment groups (e.g., Theodorakis et al., 2000). However, just because an individual reports using a verbal cue (even) very frequently, does not rule out the possibility that he/she is also making use of additional self-talk cues, perhaps equally as frequently. Indeed, when asked for the content of their self-talk, participants in the present study reported employing their assigned verbal cues in addition to self-talk statements that were not assigned to them. This may be due to the importance and complexity of self-talk as a cognitive process. As a result, the absolute manipulation of such a well-used and sophisticated process may, at the very least, be an extremely difficult goal to achieve.

Although this may seem like a bleak prognosis, there are experimental approaches that can be employed to gain a greater understanding of the use of self-talk. For example, future experimental self-talk research can go one stage further than the present study and assess how frequently participants employ each of their reported verbal cues utilized during tasks, expressed as a percentage. It should then be possible for researchers to form post-hoc groups based on ratios of self-talk (e.g. groupings based on the utilization of a majority of instructional self-talk versus a majority of motivational self-talk). Unfortunately, as only the frequency of the use of self-talk in general, not the frequency of each of the verbal cues reported, was assessed in the present study, sufficiently detailed data was not obtained in order to carry out this suggestion.

Another related experimental design issue revolves around the use of control groups. When post-manipulation check data from the present study are combined with data from previous self-talk experiments it is evident that true, pure control groups are not generated. For example, only two members of the present study's control group reported the absence of self-talk. Additionally, approximately 61% of Theodorakis et al.'s (2000) control participants reported specific thoughts during the completion of their tasks. Such groups are more correctly termed contrast groups (APA Board of Scientific Affairs, 1999). This is because although individuals are not assigned to a self-talk treatment, subjects do appear to employ treatment conditions to a certain extent. Consequently, such a group does not provide a baseline measure against which treatment groups can be compared. An alternative approach would be to focus exclusively on self-talk treatment groups alone, discarding their comparison to "control" groups. Although such an approach would not allow researchers to determine if self-talk interventions had caused observed changes in dependent variables, it would still allow investigators to successfully answer dosage response questions, as well as effectiveness questions such as the identification of the most beneficial types of self-talk.

Although the original research question could not be answered by the present study, some information about two proposed underpinning mechanisms of a self-talk—performance relationship was generated. Whilst it was found that directional interpretation of self-talk was not related to the performance of the sit-up task, another proposed mechanism, self-efficacy was

positively and mildly associated to this criterion variable. Furthermore, preliminary data was generated suggesting the presence of a self-talk—self-efficacy relationship as would be predicted by self-efficacy theory (Bandura, 1997). It is recommended that future research more closely examine this relationship with an emphasis on understanding *how* and *why* this relationship may exist. One likely theoretical mediator of self-talk's relationship with various dependent variables (e.g. performance, effort) is self-efficacy. As such, researchers should explicitly examine self-efficacy as a mediator of the self-talk—performance relationship.

With regard to self-talk's positive association with self-efficacy, although self-talk has been proposed to positively influence perceptions of self-efficacy (e.g., Hardy et al., 1996), limited studies investigating this proposal have been conducted to date. Weinberg, Grove, and Jackson (1992) found the encouragement of positive self-talk was a strategy frequently employed by tennis coaches to increase their players' self-efficacy. Thalwell and Greenlees (2003) provided qualitative evidence of the use of self-talk that aided the confidence of triathletes. Furthermore, increases in self-efficacy were found for varsity standard tennis players following an instructional self-talk intervention (Landin & Hebert, 1999). It should be noted however, that this increase was not statistically tested as the emphasis of the study was on tennis volleying performance, not self-efficacy. In short, in-depth examination of the relationship between self-talk and self-efficacy is warranted.

From an applied perspective, the present study's finding of a relationship between both measured dimensions of self-talk and self-efficacy offers initial support for the suggestion that practitioners should consider both aspects of self-talk when attempting to design effective self-talk interventions. It is argued that desired outcomes are more likely to be achieved if the consultant can determine if the athlete has disposition to a motivating or de-motivating interpretation of their self-talk. Although it would appear from the present study's finding that increasingly positive self-talk may lead to increases in perceptions of self-efficacy, the causational direction of this relationship has yet to be determined.

Although the present study was one of the first to explicitly address possible mechanisms that might explain the self-talk—performance association, and is also the first to document a significant and positive relationship between self-talk and self-efficacy, no relationship between self-talk and performance was found. Moreover, only a very modest relationship was found to exist between self-efficacy and sit-up performance. The general natures of the operational definitions of self-talk (the Self-Talk Grid) and self-efficacy, may help explain the small amount of variance account and/or lack of significance evident. The future use of more specific measures of self-talk will permit a more powerful examination of self-talk's relationships. Furthermore, although not suitable for the needs of the present study, the levels aspect of self-efficacy should not typically be absent from self-efficacy instruments (Bandura, 1997).

In sum, the findings from the present investigation contribute to the self-talk literature in a few of ways. First, self-talk researchers utilizing between group experimental designs are reminded to check their manipulation attempts with adequate detail to have confidence in the conclusions. Second, the generation of data regarding a positive association between self-talk and self-efficacy suggests that although verbal persuasion is not the most potent source of efficacious information for the athlete, it can be a useful adjunct strategy Bandura (1997). The preliminary

efficacy-related findings extend his argument to verbal persuasion given by the self. Moreover, the examination of the applicability of self-efficacy theory to the study of self-talk offers researchers the chance to correct the current lack of theory-based self-talk research in the literature (cf. Hardy et al., 2001a).

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