

SUPPLEMENTAL INSTRUCTION (SI): AN ACADEMIC SUPPORT PROGRAM

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ABSTRACT

Supplemental Instruction (SI) is an academic support program that targets challenging courses through voluntary peer-led group sessions outside the classroom. Given the proven success of SI, it is important that instructors understand how to increase student participation in the program. This paper examines the results of Goldstein et al. (2014), which was the first study to analyze factors that lead to student participation in SI programs for introductory accounting courses. Our purpose in doing so is to provide accounting instructors practical strategies to increase SI participation. It also extends the work of Goldstein et al. (2014) by introducing a new variable to their model, which provides a more subjective view of student success. In doing so, we hope to provide insight on better serving those students who are more susceptible to course withdrawal.

INTRODUCTION

Supplemental Instruction (SI) is an academic support program that targets challenging courses (Arendale, 1993, 1994). SI utilizes voluntary peer-led group sessions outside the classroom (Congos and Schoeps, 1993), in which students can receive assistance on course material. The peer, or SI leader, is a student who has successfully completed the course. This SI leader is actively involved in the course by regularly attending class sessions. This involvement is meant to help foster a more comfortable environment for students seeking help in understanding and applying course material. SI is thought to be a more effective method of course support than the traditional “medical model” (Arendale, 1993), where struggling students are identified and referred out for additional help.

SI has been shown to have a positive effect on student learning and development (Kochenour et al., 1997) and on timely graduation (Bowles et al., 2008). Two studies of particular interest (Etter et al., 2000; Jones and Fields, 2001) have demonstrated that SI programs have increased student performance in introductory accounting courses, which have a reputation for being especially challenging for students. Given these positive results, it makes sense for students enrolled in these courses to participate in SI programs. Actual student participation rates in these studies, however, were quite low (Etter et al., 2000; Jones and Fields, 2001). Low participation rates pose a significant problem. As one group of researchers has noted (Sargent et al., 2011, p. 659), “For supplemental instruction to work to support intimidated, low-aptitude, or poorly motivated students, higher participation rates will be needed”.

Goldstein et al. (2014) were among the first to address the problem of increasing SI participation in introductory accounting courses. In their study, the authors utilized the well-known Theory of Planned Behavior (TPB) (Ajzen, 1991; Ajzen and Madden, 1986), and administered a survey to students in an introductory accounting course at both the beginning and end of the semester. The purpose of the study was to discover the motivating factors behind SI participation, and determine if these factors changed over the course of the semester.

This current paper has two objectives. Based on Goldstein et al.’s (2014) study, it aims to review practical strategies and tactics designed to increase SI program participation in introductory accounting courses. It also extends the study by incorporating a variable that measures a more subjective view of student success. As mentioned above, previous work (Etter et al., 2000; Jones and Fields, 2001) has shown that SI participation leads to higher student performance. Etter et al. (2000) use cumulative exam scores to measure performance, and Jones and Fields (2001) use overall course grade. Such measures made sense in these studies, given that the authors were evaluating the overall effectiveness of SI programs. Given that we, like Goldstein et al. (2014), are concerned with student motivation needed to increase participation, we examine performance from the student’s perspective. This approach recognizes the fact that different types of students may have different outcome goals for the same course. For example, one student may wish to attain an “A” in the course, while another may be content to attain a “C”. *Perceived Performance Differential (PPD)* operationalizes this concept by computing the

difference between *Goal Grade*, which is the outcome that a student desires to attain in the course, and *Expected Grade*, which is the outcome that a student believes that he or she will achieve in the course. *PPD* provides insight into the students who are most at-risk for course withdrawal, that is, those who believe that they are performing at a lower level (*Expected Grade*) in the course than they desire (*Goal Grade*). The analysis involving *PPD* utilizes the same data as used by examining Goldstein et al. (2014). This allows us to understand how the conclusions of that study can be interpreted through the *PPD* lens.

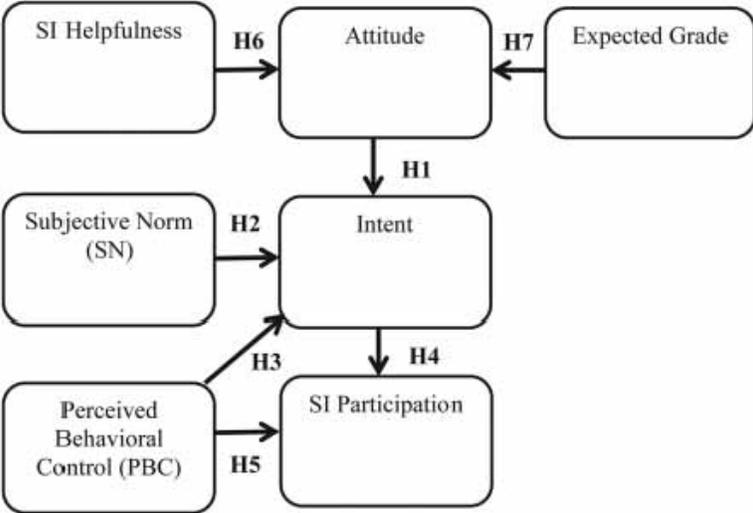
METHODOLOGY AND RESULTS OF GOLDSTEIN ET AL. (2014)

Goldstein et al. (2014) leveraged the Theory of Planned Behavior (TPB) (Ajzen, 1991; Ajzen and Madden, 1986) to examine the motivating factors behind student participation in SI programs. The authors describe TPB in the following manner (2014, p. 510).

According to TPB, a person’s *behavior* is dictated by his or her *intention* to engage in that behavior. In turn, this intention is influenced by three constructs: *attitude*, which represents the person’s attitude toward the behavior; *subjective norm*, which represents the pressure that the person perceives from influential others to undertake the behavior; and *perceived behavioral control*, which represents the person’s perception of how much control he or she has over performing the behavior. In TPB, attitude, subjective norm, and perceived behavioral control influence behavior indirectly through mediation by intention, while perceived behavioral control also influences behavior directly.

The adapted model and tested hypotheses are shown below in Figure 1. The constructs of the model were measured through a survey of 74 students in an introductory accounting course at the beginning and end of the semester. The survey items can be seen in Table 1 in the paper (Goldstein et al., 2014, p. 513).

Figure 1 – Model from Previous Study (Goldstein et al., 2014)



The model was tested with generalized structured component analysis (GeSCA) (Hwang, 2009), and the results are replicated in Table 1.

Table 1 – Results of Study (Goldstein et al., 2014, p. 519)

Hypotheses	Group 1		Group 2	
	Beginning of Semester		End of Semester	
	Estimate	CR	Estimate	CR
H1: Attitude->Intent	0.583*	6.08*	0.574*	6.95*
H2: SN->Intent	0.173	1.69	0.226*	3.05*
H3: PBC->Intent	-0.089	1.07	0.162	1.42
H4: Intent->SI Participation	0.475*	7.11*	0.567*	9.02*
H5: PBC->SI Participation	-0.003	0.02	-0.004	0.03
H6: SI Helpfulness->Attitude	0.332*	2.60*	0.529*	6.08*
H7: Expected Grade->Attitude	0.290*	2.61*	0.253*	2.90*

CR* = sig at .05 level

The results of the previous study indicate that there is a significant positive relationship between student *Attitude* toward SI participation and *Intent* to participate in SI and in turn between *Intent* to participate in SI and actual *SI Participation* at both the beginning and end of the semester. Given this, the relationships of the other variables with *Attitude* and/or *Intent* can offer insights into what may motivate *SI Participation*. For example, the size of the significant relationship of *Expected Grade* with *Attitude* offers evidence that students with lower expected grades have a better attitude toward SI at the beginning and end of the semester. While this offers evidence that agrees with other studies (Etter et al., 2000; Jones and Fields, 2001) that SI participation leads to higher course grades, it is really some other variables in the model (*SI Helpfulness*, *Subjective Norm*, and *Perceived Behavioral Control*) that provide the best insight concerning practical means of increasing SI participation. We review the results concerning these three variables below, and then discuss practical ways in the next section that they can be used to increase SI participation in introductory accounting courses.

SI Helpfulness

Goldstein et al. (2014) found that *SI Helpfulness* was significant related to *Attitude* toward SI at both the beginning and end of the semester. This means that the more helpful a student perceives SI, the more positive their attitude toward SI, and thus, the greater his/her *Intent* to participate in SI. Goldstein et al. (2014) also examined the correlation between *Intent* and each of the five *SI Helpfulness* indicator variables for three sub-sets of respondents based on *Expected Grade* categories. The results are shown in Table 2.

Table 2 – Correlation of Intent with Helpfulness Items by Expected Grade at End Semester
(Goldstein et al., 2014, p. 520)

End Semester	Expected Grade	Expected Grade	Expected Grade
Expected Grade (A B or C)	= A	= B	= C
	N=29	N=30	N = 15
Help me to gain a better understanding of the subject matter of ACC ___	0.371*	0.435*	0.237
Help me to keep up with my studies	0.166	0.428*	0.406
Help me to develop good study habits, self-discipline, and a feeling of self-satisfaction	0.116	0.212	0.529*
Help me to get information and explanations regarding materials to be covered on tests	0.225	0.227	0.711**
Help me to do well and get a high grade in ACC ___	0.390*	0.243	0.578*

* $p \leq 0.05$

** $p < 0.01$

The above results indicate that there are marked differences between the three groups. As stated by Goldstein et al. (2014, p. 520), “Apparently, *Expected Grade* provides a good basis for the benefits that different groups of students will find important with respect to what they believe is most helpful in intending to participate in SI sessions”.

Subjective Norm (SN)

Goldstein et al. (2014) found that *Subjective Norm (SN)* was significant with respect to *Intent* to participate in SI sessions at the end of the semester, but not the beginning. The authors also examined the correlation between the factor score-based *Intent* measure and the *SN* measure for each of the four sources of SN. All four sources were significantly correlated with *Intent*. The correlations are replicated in Table 3. Close friends was most highly correlated with *Intent*, followed by classmates, instructors, and parents.

Table 3 – Correlation of Intent with Subjective Norm Sources at End of Semester
(Goldstein et al., 2014, p. 520)

Norm Source	End of Semester
Classmates	.329**
Instructor	.293*
Parents	.282*
Close Friends	.437**

* $p \leq 0.05$
** $p < 0.01$

Perceived Behavioral Control (PBC)

Goldstein et al. (2014) found that *Perceived Behavioral Control (PBC)* was insignificant with respect to both *Intent* to participate in SI sessions and *SI Participation* at the beginning and end of the semester.

PRACTICAL APPLICATION OF RESULTS OF GOLDSTEIN ET AL. (2014)

As discussed in the previous section, the results concerning three variables in Goldstein et al.'s (2014) model offer the best insight in offering ways to increase SI participation. We will proceed to interpret the ways in which these results can be leveraged. Results concerning two of these variables, *SI Helpfulness* and *Subjective Norm*, are best understood in conjunction with one another. The results concerning *Perceived Behavioral Control (PBC)* raise an interesting research question which we attempt to answer through our extension of the previous study.

SI Helpfulness - Results

As indicated by Goldstein et al. (2014), the significance of the relationship between *SI Helpfulness* and *Attitude*, which in turn influences *Intent* and ultimately *SI Participation*, highlights the importance of demonstrating the ways in which the SI program can help students. The results replicated in Table 2 provide further insight into how such benefits can be communicated to students. It has been pointed out that students may be more willing to participate in an SI program rather than the traditional “medical model” of tutoring (Arendale 1993), since SI does not have the same stigma wherein struggling students are identified and referred out for additional help. The results in Table 2 reinforce this point of view, since it can be seen that students see SI as providing some form of benefits regardless of their expected performance in the course. Additionally, it is interesting that there is such a distinct difference between student performance level and the benefits that they see as helpful. Those students expecting an “A” or “B” in the course will most likely have a greater *Intent* to participate in the SI sessions if they believe that they will help them to understand course concepts. However, those students expecting an “A” will have a higher *Intent* if they believe that the sessions will help them to achieve the “A”, while those expecting a “B” will have a higher *Intent* if they perceive that the sessions will help them keep up with their studies. Those students expecting a “C” will have a higher *Intent* to attend if they believe that the sessions will help them to develop basic skills such as good study habits and get information and explanations regarding exams.

Interestingly enough, the fact that both students expecting an “A” and those expecting a “C” have a higher *Intent* if they see the sessions as helping them attain a “high” grade provide a good basis for the extension to the Goldstein et al. (2014) study that we describe later in this paper. The application of the results concerning *SI Helpfulness* are best understood in relation to those concerning *Subjective Norm*.

Subjective Norm (SN) – Results

The results replicated in Table 3, concerning the end of the semester, indicate that peers are the most important referents for the respondents when it comes to influencing *Intent* to attend SI sessions. Specifically, close friends ($r = 0.437$) and classmates ($r = 0.329$) exhibit the highest correlation with *Intent*. The two other referents, the course instructor ($r = 0.293$) and parents ($r = 0.282$) were also significantly correlated with *Intent* at the end of the semester, though not as highly as the peer referents.

SI Helpfulness and Subjective Norm – Application of Results

We have discussed the importance of communicating the benefits of SI sessions to students. The results concerning *SI Helpfulness* provide insight into the content of this communication, while the results concerning *SN* can assist with the means of conveying the message. Given that the referents shown in Table 3 appear to have a growing influence on student *Intent* to attend SI sessions, they can be utilized to communicate the benefits of SI. The growing influence of the peer referents (classmates and close friends) over the semester makes sense – fellow students would grow to see the benefits reflected in Table 2 as they experienced them through their participation. Instructors could leverage this influence through in-class testimonials of students who have seen these benefits. Such testimonials should involve students of all performance levels and the benefits shown in Table 2 should be highlighted. This will reinforce the message that SI is for all students, regardless of how they are doing in the course, and that the service has a myriad of benefits. The growing influence of authoritative referents (instructor and parents) also makes sense. As the semester progresses, students will naturally become more concerned with the final outcome of the course, especially in a difficult subject, and will feel more pressure for a successful grade. Instructors can leverage the influence of parents by communicating with them the existence of the program and its benefits through including the details in institutional literature. They can also leverage their own influence by continuing to remind students of the SI program and its benefits through in-class discussions throughout the semester.

Perceived Behavioral Control (PBC) – Results and Additional Research Question

As can be seen in Table 1, *PBC* is not significant with respect to *Intent* or *SI Participation* at the beginning or end of the semester. Goldstein et al. (2014) discuss how this may indicate that participation should be mandatory for all students as opposed to voluntary, but do not come to any definitive conclusion concerning this. The extension of the original work in the next section offers some resolution to this question. This result regarding *PBC* addresses the source of motivation to participate in SI. The significant correlation of *intent* with *SN* indicates

that motivation is coming from interaction with significant others, and not from individual self-motivation as would be the case if PBC had a significant relationship with Intent.

EXTENSION OF PREVIOUS STUDY – MOTIVATION AND METHODOLOGY

The model in the previous study (Figure 1) allowed for a general exploration of factors that affect motivation to participate in SI. For example, the study found that the lower a student's *Expected Grade* in the course, the stronger their *Attitude* toward SI services. This finding makes general sense as the average student would likely see the need for SI if they felt they were earning a lower course grade. The use of *Expected Grade* as a measure also makes sense as it is generally accepted that higher grades on the scale are more preferable to lower grades. However, specific grade levels are viewed equally important by different students, based primarily on their realistic expectations as to what they potentially could achieve.

In this section, we attempt to gain more insight into student motivation to utilize SI services by introducing a new variable, *Perceived Performance Differential (PPD)*. *PPD* recognizes the fact that different types of students may have different outcome goals for the same class. For example, one student may realistically wish to attain an “A” in the course, while another may be content to attain a “C”. We operationalize *PPD* as the comparison between two measures obtained through the initial survey by Goldstein et al. (2014). *Goal Grade* represents the grade that students would like to achieve in the class, and *Expected Grade* represents the grade that students believe that they will ultimately earn in the course. This provides a more success-based measure dependent upon student perception of performance relative to the student's desired goal for the class. Previous studies examining SI in introductory accounting courses focused on the effect of the program on overall course performance. Therefore, measures such as cumulative exam score (Etter et al. 2000) and overall course grade (Jones et al. 2001) were used. Such measures made sense in these studies, given that the authors were evaluating the overall effectiveness of SI programs. Given that we, like Goldstein et al. (2014), are examining student motivation to increase participation, we examine performance from the student's relatively more realistic perspective. Specifically, we will be evaluating the conclusions of the previous study by Goldstein et al. (2014) from the perspective of *PPD*.

Using *PPD* we classified the 74 respondents of the initial survey into three groups, as can be seen in Table 4. Since the classifications are based on individual perceptions, we deem those respondents who expect a grade greater than their personal goal as “Optimists”. Those who expect a grade equivalent to their goal are deemed “Realists”, and those who expect a grade below their goal are deemed “Pessimists”.

Table 4 – Survey Respondents by *PPD*

Group	PPD	No. of Respondents, Beg. (End)
Optimists	Goal Grade < Expected Grade	11 (5)
Realists	Goal Grade = Expected Grade	30 (41)
Pessimists	Goal Grade > Expected Grade	33 (28)

The goal of an SI program is to increase student success in challenging courses. In addition to grade-based performance, success includes the reduction of student withdrawals. This is reflected in the fact that researchers have identified student retention (Blanc and Martin 1994; Bowles et al. 2007) and timely graduation rates (Rath et al. 2007) among the benefits of SI. From this perspective, the students that we have deemed “Pessimists” are those who are most at risk of withdrawing from the course. This risk can exist for students that have been traditionally thought of as being immune to it. For example, a student with a “B” average is not typically seen as a person at risk of withdrawal due to performance. However, if this student is aiming for an “A” in the course, he or she would be classified as a “Pessimist” and may withdraw due to a perceived personal failure to meet this goal. In fact, it is possible that this student would have a higher risk of withdrawal than a student earning a “C” who is classified as a “Realist”.

Whereas the previous study by Goldstein et al. (2014) focused on the factors affecting motivation for SI participation from an overall perspective, the work in this section of our paper examines the same factors with the objective of affecting those students most at risk of course withdrawal, the “Pessimists”. Due to the sample sizes¹ of these three groups, we use correlation analysis to examine differences among them with respect to the relationships discussed in the previous section.

EXTENSION OF PREVIOUS STUDY – RESULTS

In this section we will proceed to examine the same key relationships that we focused on in our discussion of Goldstein et al.’s (2014) initial study.

SI Helpfulness

As in the initial study (Table 2), we examined the correlation of *Intent* with the items used to measure *SI Helpfulness*. However, we conducted this study by grouping on the basis of *PPD* as opposed to *Expected Grade*.

Table 5. Correlation of Intent with Helpfulness Items by PPD at End of Semester

¹ It is interesting to note that Table 4 shows that the number of respondents in the “Realists” category increased from the beginning of the semester to the end. This is a desirable effect, as the number of “Pessimists” (and hopefully the risk of withdrawal) has fallen over the course of the semester.

End Semester	Optimists	Realists	Pessimists
Help me to gain a better understanding of the subject matter of ACC__	0.208	0.464**	0.255
Help me to keep up with my studies	0.208	0.308*	0.075
Help me to develop good study habits, self-discipline, and a feeling of self-satisfaction	-0.295	0.239	0.122
Help me to get information and explanations regarding materials to be covered on tests	0.013	0.324*	0.107
Help me to do well and get a high grade in ACC ____	0.326	0.329*	0.196

* $p \leq 0.05$

** $p < 0.01$

The results in Table 5 are counter intuitive. The group that we are most concerned about, the “Pessimists”, do not display any significant correlation between the five *SI Helpfulness* items and *Intent* to attend SI. The “Realists” show significant correlation between *Intent* and all five *SI Helpfulness* items. This means that the students perceiving that they are meeting their goals are the ones that find benefits of SI important with respect to what they believe is most helpful in intending to participate in SI sessions, while those most susceptible to withdrawing are earning lower grades than desired yet are not seeing the benefits of the program.

Subjective Norm (SN)

Unlike the initial study results replicated in Table 3, we noted no significant correlations of *Intent* with *Subjective Norm* sources at the end of the semester. However, as shown in Table 6, we did note one significant correlation at the beginning of the semester for “Pessimists”.

This appears to indicate that the instructor of the introductory accounting course is the only referent that can influence the *Intent* of “Pessimists” to attend SI sessions, and that this influence is only effective at the beginning of the semester.

Table 6. Correlation of Intent with Subjective Norm Sources at Beginning of Semester

Norm Source	Pessimists
Classmates	-.048
Instructor	.361*
Parents	.153
Close Friends	-.051

* $p \leq 0.05$

Perceived Behavioral Control (PBC)

In the initial study, Goldstein et al. (2014) found no significant relationship between *PBC* and *Intent* to attend SI sessions. Table 7 shows the correlation between *PBC* and *Intent* for each of our *PPD* groups at the end of the semester.

Table 7. Correlation of Intent with PBC at End of Semester

PPD Group	
Optimists	.155
Realists	.056
Pessimists	.505**

** $p \leq 0.001$

As can be seen, the “Pessimists” show a highly significant correlation between *PBC* and *Intent* at the end of the semester, while the other two groups do not.

CONCLUSION – BRINGING IT ALL TOGETHER

Goldstein et al. (2014) were among the first to study factors that motivate students to participate in Supplemental Instruction (SI) programs offered in introductory accounting courses. The study was significant with respect to previous work (Etter et al. 2000; Jones and Fields 2001) that had indicated that SI programs led to improved student performance in introductory accounting courses. In this paper, we have built upon the work of Goldstein et al. (2014) to suggest some practical strategies and tactics that can be implemented to increase student participation in SI programs. We have also extended this work by evaluating the previous study’s conclusions through the lens of a new variable, *Perceived Performance Differential (PPD)*. *PPD* recognizes that students’ personal performance goals in light of their perceived performance in the course may be an important motivating factor in seeking assistance through SI. We conducted this analysis by breaking the 74 respondents to the survey used by Goldstein et al. (2014) into the three distinct *PPD* groups shown in Table 4. Of these three groups, the

“Pessimists” are of most interest to us as this group of respondents believes that they are underperforming with respect to their personal goals and, therefore, are the most likely to withdraw from the course and possibly from the college. In this concluding section, we now interpret the results of the initial study, which provides guidance on increasing overall SI participation by all students, in conjunction with what we have learned concerning *PPD* classifications, which provides guidance in increasing SI participation for those students most at risk for course withdrawal.

Our review of the initial study’s conclusions regarding *SI Helpfulness* and *Subjective Norm* led us to suggest that it is important to stress all of the benefits of SI to students, as it appears that students at different performance levels value different benefits. This can be best done through in-class testimonials of experienced benefits by students at all performance levels, as peer referents exhibit the highest correlation with *Intent* to attend SI sessions. Given the results of Goldstein et al. (2014), this should have the effect of increasing overall SI participation. When it comes to *PPD* groupings, it is interesting that the “Realists” display significant correlations between four out of five of the *SI Helpfulness* items and *Intent*, but the “Pessimists” show no such correlations. Additionally, the only *SN* referent with a significant correlation to *Intent* is the course instructor, and this is only present at the beginning of the semester. In order to motivate students in the at-risk group to attend SI, the initial model suggests that it is necessary to convince them of the benefits of the service. Therefore, the above suggestion of in-class testimonials may have some effect, especially if those touting the benefits are “Realists” and portray SI as helping them to meet or exceed their personal grade goals. However, our analysis of *PPD* groupings appears to suggest that the course instructor has the greatest influence on “Pessimists” regarding *Intent*. This stresses the need for the instructors to discuss the importance of SI in the classroom. This should be done throughout the semester, especially at the start given the fact that the influence appears to be greater at the beginning of the semester than at the end. It is also possible for the instructor to take this to another level by identifying those students in the “Pessimist” grouping (perhaps through a survey), and reaching out to them to promote the benefits of SI.

The study by Goldstein et al. (2014) raised an interesting question regarding the voluntary nature of SI programs. In the initial model, *Perceived Behavioral Control (PBC)* had no significant impact on student *Intent* to attend SI. Similar results have led other researchers to question whether SI programs should be mandatory for students (Hodges et al. 2001). The question becomes easier to answer through the lens of *PPD*. Our results show that “Pessimists” exhibit a strong correlation between *PBC* and *Intent*. Apparently, the group that we are most concerned with has strong feelings concerning the degree of control that they have over participating in the SI program. This appears to indicate that it makes sense to keep SI programs voluntary.

Our work is not without limitations. To begin with, our sample size is quite small, especially with regard to *PPD* groupings. Future work could examine motivating factors in light of the movement of students within *PPD* groupings, using full-model testing such as that used by Goldstein et al. (2014) by *PPD* group, and the addition of other variables to the initial model.

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