LEARNING TO HEAR BY LEARNING TO SPEAK: THE EFFECT OF ARTICULATORY TRAINING ON ARAB LEARNERS' ENGLISH PHONEMIC DISCRIMINATION

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In this paper we explore English pronunciation teaching within an English as an International Language (EIL) framework, arguing that teaching learners how to produce English phonemes can lead to an improvement in their aural ability. English as an Additional Language (EAL) learners often have difficulty discriminating between and producing specific sounds of the target language; Arabic speakers, for example, typically have difficulty distinguishing between /p/ and /b/ in words such as *pin* and *bin*. The research described here indicates that explicit articulatory training in the production of two problematic sounds, /p/ and /b/, improves learners' ability to perceptually discriminate between the two. Following articulatory training, participants were better at correctly identifying which member of a minimal pair they heard (*pack* or *back*, for example), whereas simply providing focused aural exposure to those sounds, as advocated in the non-form focused intuitive-imitative approach, did not lead to similar improvement. This suggests that for sounds that are perceptually difficult for learners, complementing exposure as advocated by the intuitive-imitative approach with articulatory training may produce the best results in terms of segmental discrimination and ultimately target language production. We also point to evidence that accuracy in segmental production is especially relevant in the EIL context.

KEY WORDS: EIL (English as an International Language), EAL (English as an Additional Language), phonemic discrimination, teaching listening, teaching English pronunciation

INTRODUCTION

Pronunciation is an essential element of oral communication. There are questions, however, regarding how pronunciation should be taught. Two approaches prevalent in the literature include: 1) the intuitive-imitative approach in which the learner listens and imitates; and 2) the analytic-linguistic approach, which complements the intuitive-imitative approach by utilizing explicit information about the production of sounds (Celce-Murcia, Brinton, & Goodwin, 1996). The intuitive-imitative approach has predominated for much of the past 30 years or so largely due to the dominance of the communicative method, which generally eschews non-communicative activities such as articulatory training and productive drills. Another aspect of

teaching pronunciation that is traceable to the dominance of the communicative method is a focus on suprasegmental aspects of pronunciation (prosody) with little or no attention paid to the production of individual segments. The growing recognition of the importance of English as an International Language (EIL) raises questions regarding the advisability of focusing solely on prosodic features of pronunciation, and that in turn raises questions about the advisability of avoiding analytic-linguistic approaches or form-focused approaches to teaching pronunciation.ⁱ

The next three sections of this paper describe how an expanded view of teaching English inherent within the study of EIL supports the view that explicit instruction in the pronunciation of certain problematic sounds or segments is valid, and sometimes necessary. That is followed by a report on the results of an experiment testing the hypothesis that articulatory training in the production of second language sounds can enhance the ability of learners to perceptually discriminate those sounds. The experiment looks at the effect of articulatory training on the ability of Arabic speaking learners of English in Oman to perceptually discriminate the English voiceless and voiced bilabial stops /p, b/.

TEACHING ENGLISH LANGUAGE PRONUNCIATION IN A GLOBAL CONTEXT

Second Language Acquisition (SLA) research traditionally has focused on target forms of language as produced by native speakers (NS) and learned by non-native speakers (NNS). This SLA terminology has been criticized in the World Englishes and EIL literature for its value-laden presuppositions, which privilege NS English norms over NNS English norms (Ammon, 2000; Jenkins, 2009; Kirkpatrick, 2007), and also because of issues relating to the classification of English speakers from countries such as India and Singapore (Higgins, 2003; Kirkpatrick, 2007)." Sharifian (2009) cites Kachru's (1985) notion of inner-circle countries (IC), outer-circle countries (OC), and expanding-circle countries (EC) in noting that much SLA research involves NS from IC where English is the language of the state (e.g. Australia or the U.S.A.) and not NNS from either OC, former British dominions where English is still widely used as a additional language to communicate between different groups (e.g. India), or EC, where English plays an important commercial, educational or other role (e.g. Oman). This omission is questionable considering that Crystal (1997) estimated that at the end of the 20th century, 320 million to 380 million people were using English as a first language, but that between 750 million to more than a billion people were using it as a second or additional language. In 2008 he revised this figure, based primarily on the growth of use of English in India and China, to a total of two billion English users, with three to four NNS for every NS. He also suggested that as much as 80% of all English language communication involves interaction between NNS. This has led a number of researchers (Clyne & Sharifian, 2008; Jenkins, 2000, 2002; Kirkpatrick, 2007; Levis, 2005; Pennycook, 1999; Seidlhofer, 2004, 2005; Sharifian, 2009) to argue for a new, broader-based definition of an English user and for a concomitant user-based model of L2 pedagogy. Sharifian (2009), for example, notes that both the core SLA concepts of NS-NNS and Kachru's metaphor of language circles privilege

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English NS while pushing NNS to the periphery (both conceptually and in actual research focus) while failing to take into account the predominance of NNS-NNS communication in the context of English as an International Language (EIL). Seidlhofer's (2004) work on English as used between NNS, described as English as a Lingua Franca exchanges (as seen in the Vienna-Oxford International Corpus of English - VOICE), has led to a more informed understanding of which lexico-grammar features of English are crucial for international intelligibility in NNS interactions (VOICE, 2011). This notion of international intelligibility has implications for the teaching of pronunciation.

The goal of pronunciation teaching is to help learners become intelligible. In order to achieve this goal, syllabus writers and language teachers need to consider which features of pronunciation are most important for intelligibility and therefore need to be prioritized in the classroom. A review of the literature (Kang, 2010; Levis, 2005; Saito, 2011) indicates that for over 25 years the teaching of NS-like suprasegmentals (e.g. tonic stress in Avery & Ehrlich, 1992; and sentence stress in Hahn, 2004) rather than segmentals has dominated the pronunciation curricula. The focus on suprasegmentals is supported by a limited amount of research showing that for NS listeners, the intelligibility of NNS is more dependent on NS-like suprasegmental production than accurate segmental production (Anderson-Hsieh, Johnson, & Koehler, 1992; Anderson-Hsieh & Koehler, 1988; Derwing, Munro, & Wiebe, 1998; Hahn, 2004). There is little evidence, however, to believe that NNS are equally dependent on prosodic features. In fact, there is evidence to the contrary, evidence that NNS listeners are greatly dependent on accurate production of individual sounds.

Considering the importance of NNS-NNS communication in the EIL paradigm, it is necessary to question the propriety of basing current pronunciation pedagogy on the needs of inner-circle NS listeners. Jenkins (2000, 2002) found that NNS-NNS speech communication often broke down due to problems at the segmental level, and Saito (2011) found that accurate production of certain English segments largely determined ratings of intelligibility of NNS speech on the part of English teachers in Japan. There is no suggestion here that suprasegmental features are unimportant. However, it appears that accurate production of segments, in combination with accurate production of suprasegmental features, is necessary for successful NNS-NNS communication. Since, as Crystal (1997, 2008) indicates, this type of communication comprises the vast majority of English language interactions, it is clear that the production and perception of individual English sounds has a place in pronunciation curricula. Having established the importance of individual sounds, it follows that explicit instruction in the production of certain problematic second language sounds may prove beneficial.

THE PREVAILING PRACTICES OF TEACHING ENGLISH PRONUNCIATION

Classroom practice which is informed by the communicative approach, or guided by analytic syllabi does not focus attention on form. In the communicative approach, the most common

practice for teaching intelligible L2 pronunciation is to expose learners to NS target forms and then provide them with the opportunity to practice producing those target forms (Kang, 2010: Levis, 2005). Such an intuitive-imitative approach holds that learners' speaking skills can be improved through aural exposure to the target language in the classroom and through learners imitating the sounds and rhythms of that language without those forms being explicitly taught (Celce-Murcia, Brinton & Goodwin, 1996). This assumption underpins many analytic syllabus types such as a Task Based Learning (TBL) syllabus. Hall (2011) notes that TBL originated from Prabhu's Bangalore Project in the 1980s, where the meaning, as opposed to the form of what was said (e.g. phonological structures), provided the organizing principle for language classes. In TBL classrooms, learners imitate the language used by the teacher while performing tasks focused on comprehension such as informationgaps. There is no explicit focus on grammar or phonology. This intuitive-imitative approach associated with analytic syllabus types is privileged in much of the literature to the point that form-focused approaches are often ignored or discredited as ineffective. For example, in Scrivener's (2005, p. 178) Learning Teaching, a core text used by Cambridge Assessment's CELTA (Certificate in English Language Teaching to Adults), the author states that focusing on the production and perception of individual sounds may sound appealing but is "virtually impossible to do". The embrace of the intuitive-imitative approach can be seen in numerous training manuals, textbooks, and on-line sites devoted to tips for training ESL teachers (Dupuy, 1999; International House, 2009; Krashen, 1996; Morley, 1991; Nation & Newton, 2009; Ridgway, 2000; Scrivener, 2005; Seidlhofer, 2001; Ur, 2008).

An exception to the tendency to downplay the potential contribution of utilizing the formfocused approach is found in Underhill (2005), which includes numerous activities centred on exploring how sounds are produced. He writes that learners can profit from an "experienced awareness of how they produce sounds by manipulating their vocal musculature, and how the internal sensation of using the muscles relates to what is heard through the ears..." and that learners should be made aware of how they can "...use their musculature to produce new or different sounds." (Underhill, 2005, p. xi). Underhill's approach is consistent with the central claim of this paper- that explicit instruction in production has a legitimate place in the pronunciation curriculum.

The intuitive-imitative approach is justified in stressing that listening is of paramount importance in achieving intelligibility. However, for particular problematic second language sounds, we argue that a complementary form-focused approach is beneficial. It is widely recognized that even after considerable exposure, many second language learners simply fail to hear the difference between two sounds in the second language. Trubetzkoy's (1939) notion of a phonological filter and Flege's (1991) description of equivalence classification describe the mechanisms through which such perceptual confusion may occur. The claim here is that perception of the sounds that are wrongly classified as the same sound by second

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language learners, whether due to filtering the sounds through the first language phonological system or due to equivalence classification, can be enhanced through explicit instruction in the production of those sounds. The experiment described in this paper is designed to determine if explicit instruction in the production of such sounds can improve the ability to perceptually separate the two sounds that were previously heard as one and the same sound.

PROBLEMATIC ENGLISH CONSONANTS FOR ARABIC SPEAKERS

This study specifically investigates whether articulatory training in the production of the bilabial stops /p/ and /b/ improves the ability of Arabic speaking learners of English in Oman to perceptually discriminate those two sounds. The phonemic inventory of Modern Standard Arabic (MSA) includes the voiced bilabial stop /b/, but there is no voiceless equivalent. Altaha (1995) and Jalal (2011) found that English learners who speak regional versions of MSA in Saudi Arabia had difficulty perceiving English consonants for which there is no equivalent or near equivalent in MSA. Al-Beloushi's (2012) unpublished study of young Omani learners found that they also struggled to produce phonemes lacking MSA equivalents. Thus, as a first step in investigating the possibility that articulatory training can enhance perception on the part of Omani learners of English, we chose to focus on the /p, b/ contrast.

THE EXPERIMENT

THE RESEARCH QUESTION

Can articulatory training improve learner ability to perceptually discriminate problematic L2 sounds? More specifically, do Arabic speaking learners of English who undergo explicit instruction in the production of /p/ and /b/ improve in terms of ability to accurately perceive those two sounds more so than learners who receive only aural instruction? In other words, is the form-focused approach beneficial for perceptual discrimination of sounds that are wrongly classified as the same sound?

PARTICIPANTS

Subjects were in the first year of the English Language Studies program at Sohar University in Sohar, Oman having completed an English language foundation programme which according to the Oman Accreditation Authority guidelines (2008) produces graduates with proficiency levels matching an overall equivalent IELTS score of 5.0, with no area skills area (e.g. speaking, listening) below 4.5. All subjects were native speakers of Arabic. Subjects participated as part of their regular class groups, in their regular class times, and therefore, were neither randomly selected nor randomly assigned to groups. The experimental group received explicit training in the production of the two sounds while the control group received additional practice in the listen and repeat mode, but no articulatory training.

The experimental group was comprised of 33 students, all female, ranging in age from 18 to 27, with a median age of 20. The control group was comprised of 20 students, all female, ranging in age from 18 to 24, with a median age of 20.

MATERIALS

Materials were designed to test the ability of subjects to perceptually discriminate between /p/ and /b/. Ten minimal pairs were identified for this pair of sounds. All of the words chosen are among the 2000 most frequently occurring words in the *British National Corpus*; as such all the words included were reasonably assumed to be familiar to the participants (The British National Corpus, 2007). Recordings were made in which one of the words from the minimal pair was embedded within the sentence 'The man said _____ again'. Each sentence was read twice on the recording. Subjects were provided with answer sheets and instructed to circle the word that they heard. For example, subjects would hear the sentence 'The man said <u>pack</u> again' and would circle either 'pack' or 'back' depending on the word they believed they had heard.

There were twenty items for each test, two from each of the ten minimal pairs listed below.

pack-back	pin-bin
pill-bill	pan-ban
pet-bet	post-boast
pat-bat	pump-bump
pride-bride	path-bath

The first author, a native speaker of American English, recorded the stimulus sentences using *Audio Hijack Pro* on an Apple MacBook Pro computer. The sentences were read at a pace somewhat slower than normal conversation, with careful pronunciation. Each sentence was read twice in close succession, and there was approximately a four second pause between the different sentences. The stimuli were presented to subjects through headphones in a computer laboratory setting.

PROCEDURE

A pre-test was administered at the start of the class. Then, the experimental groups received training in the production of the two sounds in question. The control group received no training in production but received only additional auditory exposure to the sounds. The training or exposure to the sounds was very brief, lasting only about 20 minutes. A post-test was administered at the end of the training or additional exposure, and a post-post test was administered a week later to see if any improvement in perceptual ability lasted beyond the immediate term.

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The short training session (about 20 minutes) and the very short testing time (about 2 minutes) ensure that fatigue was not a factor and enhance the reliability of the procedure. We also pilot tested the presentation of test stimuli and found that the four second pause between items was enough time for subjects to replay the sound in their heads but not enough time for attention to waver. In addition, subjects listened to the stimuli through computer headphones and self-selected the volume before the testing began. The room was quiet and no one was permitted to leave or enter the room during testing.

DESCRIPTION OF TRAINING

The training session began with a listen and repeat drill. The trainer modelled pronunciation of minimal pairs, asking subjects to listen and repeat. Then there was an informal assessment of subject ability to perceptually discriminate the two sounds. That was followed by articulatory training in production of /p/ and /b/. For these particular sounds, training focused on aspiration of the voiceless stop. The researcher explicitly drew attention to the puff of air that follows the release of a word initial /p/, and to the lack of such a puff of air following the release of /b/. This was accomplished by holding a thin strip of paper in front of the mouth, and drawing attention to the fact that the paper moved when the word 'pack' was produced, but did not move when the word 'back' was produced. The puff of air was described as not dissimilar to the sound of the glottal fricative /h/, and subjects were told that the pronunciation of words such as 'pack' could be more accurately characterized as 'p^hack'. Subjects were then given thin strips of paper and asked to practice producing the words, taking care to cause the paper to move when pronouncing words like 'pack' but not causing it to move when pronouncing words like 'back'. Then the subjects worked in pairs or groups of three and took turns pronouncing the words and testing if their fellow subjects were able to recognize which word they were producing. The session concluded with another listen and repeat drill.

The procedure was similar for the control group in that the session began with a listen and repeat drill, followed by an informal assessment of ability to perceptually discriminate between the two sounds. This step, however, involved several more minimal pairs and more repetitions. This was followed by a game in which participants were challenged to turn left or right on a map depending on which word they heard and see if they ended up in the location intended by the trainer. This session also concluded with a listen and repeat drill.

Subjects were trained at the level of individual sounds and words, and feedback was regularly provided. Test stimuli, on the other hand, were presented within carrier sentences, and there was no feedback. Logan and Pruitt (1995) point out that differences between training and testing with respect to task, stimuli, and/or presence of feedback produce results that are more generalizable. Since testing varied from the training in all three respects, generalizability of results is enhanced.

ANALYSIS

Answer sheets were collected from subjects at the end of each test, and the number of correct responses was noted for each subject. The mean number of correct responses was then calculated, as well as the standard deviation. Within each group (experimental and control), the mean for the pre-test was compared to the mean for the post-test, and a two-tailed paired T-test was used to test for statistically significant differences between the means. The same procedure was followed in comparing the mean number of correct responses on the pre-test and the post-test.

RESULTS

The results support the hypothesis that explicit training in the production of problematic second language sounds can enhance the ability to perceive those sounds. With respect to the /p,b/ contrast, subjects given articulatory training in producing the sounds showed statistically significant improvement in performance on the post-test compared to performance on the pre-test, and improved performance carried through to the post-test which was done a week after the training. Control groups, which received additional auditory exposure to the sounds, but no articulatory training, showed no improvement.

The detailed results for the experimental group can be seen in Table 1. The mean score of experimental subjects on the pre-test was 12.3, where the score represents the number of correct answers out of twenty items. The mean score on the post-test immediately after articulatory training was 15.1. This reveals a substantial improvement in ability to accurately perceive words that begin with /p/ or /b/, and the results of a two-tailed paired T-test reveal that the improvement was statistically significant (p < .001). The improvement can be seen across the group; 26 of the 33 subjects, scored higher on the post –test compared to the pretest, while scores were lower for only 3 subjects. Scores were the same on the two tests for 4 subjects.

Importantly, the improvement in perceptual ability was not transitory; the mean score on the post-post-test administered one week after the training was also 15.1, and this sustained improvement was also statistically significant (p< .001) on a two-tailed paired T-Test. In addition, the improvement from pre-test to post-post-test was prevalent across the group; 24 of 30 subjects scored higher on the post-post-test, while scores were lower for only 4 subjects, and scores were equivalent on the two tests for 2 of the subjects. (Three of the original 33 subjects in the experimental group did not participate in the post-post-test.)

Table 1. Number of correct answers out of 20 trials. Experimental group.							
Subjec t	Pre-test	Post- test	Post- post-test	Subject	Pre-test	Post-test	Post- post-test
1	9	14	13	18	15	15	14
2	11	14	14	19	9	16	17
3	12	8	11	20	7	17	14
4	11	15		21	19	20	19
5	10	13	15	22	12	13	13
6	14	18	15	23	9	13	11
7	12	13	12	24	18	19	
8	7	10	13	25	17	15	15
9	14	17	18	26	13	19	18
10	11	17	16	27	7	14	16
11	19	19	20	28	9	9	10
12	9	14		29	14	15	17
13	9	15	14	30	12	16	16
14	19	16	17	31	13	18	15
15	10	15	13	32	13	17	19
16	11	12	16	33	12	12	13
17	18	20	20				
				Mean	12.3	15.1	15.1
				SD	3.5	2.9	2.6

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As seen in Table 2, control subjects, on the other hand, showed no improvement on either the post-test or the post-post-test, and none of the changes in mean scores were statistically significant. The mean scores were 14.3 on the pre-test, 13.7 on the post-test, and 14.0 on the post-post-test. Five of the 20 subjects scored higher on the post-test than on the pre-test, while 10 subjects scored lower and 5 subjects scored the same on the two tests. Comparing changes from the pre-test to the post-post test, scores were higher for 7 of 17 subjects, lower for 8 subjects, and the same for 2 subjects. (Three of the original 20 subjects did not take the post-post test.) There is no evidence that additional listening enhanced perception.

Subje ct	Pre-test	Post- test	Post- post-test	Subject	Pre-test	Post-test	Post- post-test
1	14	13		11	17	18	16
2	8	10	11	12	17	14	14
3	16	15		13	17	16	18
4	19	19	18	14	12	11	16
5	12	16	13	15	12	6	4
6	13	13	16	16	18	18	16
7	17	17	16	17	11	9	10
8	11	8	15	18	17	17	17
9	18	19		19	11	12	11
10	13	11	16	20	13	12	11
				Mean	14.3	13.7	14.0
				SD	3.0	3.7	3.5

Table 2. Number of correct answers out of 20 trials. Control group.

The scores for control subject #15 are peculiar, evincing dramatically worse performance on the post-test and the post-post-test compared to the pre-test. This may indicate a lack of effort on the part of the subject. However, even after the scores for this subject are eliminated, there is no improvement in mean scores across the group, and the changes in performance from test to test are not statistically significant.

DISCUSSION

This is a small-scale, introductory study involving only one sound pair /p,b/ and preintermediate learners from an Arabic L1 background, but the results here do provide intriguing evidence indicating that articulatory training does indeed enhance learner ability to perceptually discriminate between two problematic sounds in a way that additional listening practice does not. Subjects who received articulatory training in the production of /p/ and /b/ were better able to perceptually discriminate those sounds while subjects who received only additional aural exposure to the sounds showed no such improvement. These findings

provide support for Underhill's (2005) suggestion that increased somatosensory awareness of the production of speech sounds is beneficial, and that activities that allow learners to raise that awareness by exploring how sounds are produced can lead to improved intelligibility.

Within the EIL context, the work of Crystal (1997), Jenkins (2000, 2002, 2009), Higgins (2003), Saito (2011), Seidlhofer (2004), and Sharifan (2009) indicate that English as Additional language educationalists are well-advised to address the needs of learners who will use English in a global context. Jenkins (2000, 2002, 2009) and Saito (2011) offer compelling evidence that intelligibility in that context is dependent on accurate perception of individual segments. The accurate perception of individual segments does indeed matter, and the results of this experiment indicate that perception of segments can be improved through articulatory training. There is thus good reason to believe that using the form-focused approach in conjunction with the intuitive-imitative approach can maximize the intelligibility of learners of EIL. For a majority of sounds, exposure may be sufficient, but for problematic sounds that are perceptually difficult for learners. Teachers of EIL should be aware of the possibility of perceptual confusion, make attempts to discover which sounds are problematic for their students, and make use of articulatory training in addressing the gaps in perception and pronunciation that hinder intelligibility.

FUTURE DIRECTIONS

The findings here point to several potentially rich avenues of research related to the topic of articulatory training and its effect on perception. As mentioned above, this research involved only one sound pair /p,b/, and all the subjects were pre-intermediate level English as Additional Language learners with Arabic as the first language. Similar findings across a larger number of sounds, both consonants and vowels, and involving subjects at different levels and with different language backgrounds would strengthen our argument. We are currently concluding research in Oman involving a wider selection of sounds that are problematic for Arabic speakers. It would also be worthwhile to investigate the effect of explicit instruction on other aspects of perception and production such as prosody and consonant clusters.

Further study may be especially fruitful in shedding light on the issues related to effectiveness of training in production for learners at different levels. At what point in development are learners most likely to benefit from the training? Our subjects were all preintermediate. It would be advantageous to see whether less advanced and/or more advanced learners could also benefit. It may be particularly interesting to see if more advanced learners with fossilized deficiencies could benefit. This study has demonstrated that English as Additional Language learner improvements in perception can be gained through form-focused articulatory training, and while it is tempting to claim that articulatory training also improves the accuracy of production, we did not measure and cannot comment on an improvement in accuracy of production. While it is also tempting to infer that improved production preceded improved perception, this is an issue that is left for further research. Over-reliance on the currently dominant intuitive-imitative approach rests on the belief that perception necessarily precedes production, and this study provides evidence that the perception-production relationship is not so straightforward. Further research looking at this complicated relationship is warranted.

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ENDNOTES

- i The meaning of 'analytic' as used here and in phonology studies is at odds with the meaning of the term when used in classifying syllabus types. The analytic-linguistic approach is, counterintuitively, consistent with a synthetic syllabus type and not an analytic syllabus type. The synthetic/analytic distinction classifies syllabi along a continuum. In a synthetic syllabus, different linguistic structures of the language are taught separately and step-by-step. Learners then synthesize these parts into a whole language. An analytic syllabus, on the other hand, is organized in terms of functions, and the language is not pre-modified or simplified for the students. The learner is required to be analytic and perceive language patterns or rules (Long & Crookes, 2002). To avoid confusion, the expression 'form-focused approach' will be used in the rest of this paper to refer to the analytic-linguistic approach.
- ii Many proponents of World Englishes do not accept the traditional NS-NNS distinction at all. Use of the terms here is not a challenge to that view but reflects an effort to be consistent with much of the SLA literature.

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