

## **The effects of large-group instruction, modeling, or See the Sound/Visual Phonics on undergraduate students learning to read Italian**

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### **Abstract**

Reading in a second language (L2) allows learners access to new vocabulary and opportunities to translate from the L2 to the first language (L1) and vice versa. In this paper, we describe three studies that explored strategies for developing L2 Italian decoding repertoires. Participants were undergraduate students preparing for a short-term study abroad trip to Italy. The results indicate that most participants acquired the target Italian letter(s)-sound relations with group instruction and that modeling and/or modeling with See the Sound/Visual Phonics were effective interventions for participants who struggled to acquire the L2 repertoires. Results are discussed in terms of selecting the effective teaching strategies to develop L2 decoding repertoires.

**Keywords:** Italian, modeling, reading, See the Sound/Visual Phonics, undergraduates

Many approaches to second language acquisition rely specifically on the learner's ability to read, both in their first language (L1) and in the second language (L2; Bochner & Bochner, 2009). The grammar translation method (Hinkle, 2005), for example, emphasizes direct translation from L1 to L2 and vice versa as the primary mode for vocabulary acquisition. Bochner and Bochner (2009) suggested that L2 learners can acquire an entire L2 repertoire solely through written texts.

Moreover, while other L2 instructional strategies (e.g., audiolingual strategy, direct [or natural] method) do not rely solely on reading as a source of instruction, it is likely that without phonological knowledge of the L2, text will be less useful as a tool in L2 acquisition.

Participants in the following experiments were undergraduate students preparing for short-term study abroad trips in Italy. Unlike undergraduate students enrolled in second language courses as a subject matter in and of itself, these students had limited time (8 weeks prior to the trip and classroom instruction time at 1 hr/week) to acquire a basic L2 proficiency. As a result, researchers were interested in finding the most efficacious way to help the learners access print in the L2 in order to support independent study tools (e.g., direct translation, access to written study materials such as workbooks and texts) and maximize the vocabulary students could acquire prior to the study abroad experience.

See the Sound/Visual Phonics (STS/VP) was developed in 1981 by the International Communication Learning Institute (ICLI) to help deaf and hard of hearing students develop articulation and phonics skills (Friedman-Narr, 2006; Krupke, 2008; Morrison, Trezek, & Paul, 2008; Woolsey, Satterfield, & Roberson, 2006). The STS/VP system has two components: a hand sign and a written code. The hand sign is a motor movement that mimics the mouth and tongue placements for English and Spanish phonemes. Each hand sign has a corresponding written code that looks like the hand sign (see Krupke, 2008; Morrison et al., 2008 for the history and origins of STS/VP). Typically, the hand sign is used to assist in the production of echoic (hear-say sound) relations and the combination of the hand sign and written code are used to assist in the production of echoic-textual (hear-see-say sound relations) or textual (see-say or decoding) relations.

STS/VP has been effective in improving reading repertoires for deaf and hard of hearing youth (Trezek & Malmgren, 2005; Trezek & Wang, 2006; Trezek, Wang, Woods, Gampp, & Paul, 2007) and kindergarten students at-risk for reading failure (Cihon, Gardner, Morrison, & Paul, 2008; Gardner, Cihon, Morrison, & Paul, 2013). Cihon et al. (2008) employed a nonconcurrent multiple baseline across participants design with an embedded alternating treatments design with replications across sounds to assess both the effectiveness of STS/VP as an intervention for kindergarten students at-risk for reading failure and to compare the utility of STS/VP instruction with and without the written code. While the results were favorable, indicating that all participants learned the target letter-sound relations, several limitations in experimental design prohibited strong conclusions from being made regarding the role of STS/VP in reading instruction and the comparative effectiveness of hand sign only versus hand sign plus written code instruction. In a follow-up study, Gardner et al. (2013) used a nonconcurrent multiple baseline design across letter-sound relations with replications across participants to evaluate the effectiveness of STS/VP as an intervention for kindergarten students at-risk for reading failure. Their results showed a stronger relationship between the use of STS/VP and the acquisition and maintenance of textual relations for this population. Specifically, the six participants acquired a total of 27 letter-sound relations following STS/VP instruction.

While the support for STS/VP as an intervention for producing reading repertoires with learners without hearing impairments is limited, the results of previous research suggests there may be some benefit to including the motor movement in the initial acquisition of letter-sound relations

when traditional forms of instruction have proven ineffective. Another population without hearing impairments who may benefit from STS/VP as a tool for assisting in the acquisition of textual (decoding) relations is those learning a second language. Similarities between L2 learners and deaf and hard of hearing learners has been described elsewhere (cf., Bochner & Bochner, 2009). These learners may benefit from the additional sources of control established by STS/VP, particularly with regard to bringing letter-sound relations under new sources of control. Specifically, adults learning a second language have a long history of reinforcement for producing specific phonemes in the presence of certain letter(s). For example, a native English speaker and reader has come into contact with reinforcement for emitting the sound /si/ in the letter combination “sci” in the word “science”. When presented with the same letter combination in Italian language (i.e., in the Italian plural word for fish, “pesci”), the learner must now produce the sound /shee/. The prior history of reinforcement for the L1 may be quite difficult for the learner to overcome in learning correct L2 pronunciation. Given the previous success of STS/VP as an intervention for producing phonetic repertoires in other populations, experimenters were interested in the application of STS/VP with those acquiring a second language.

The purpose of this study was to evaluate the effectiveness of STS/VP as an intervention to produce new letter(s)-sound relations for second language learners. Researchers were also interested in the comparative effects of STS/VP with respect to other more traditional modes of instruction (e.g., classroom-based rules regarding letter(s)-sound relations and individualized modeling of letter(s)-sound relations).

## **Study 1**

### *Method*

*Participants.* Ten undergraduate students at a Midwestern community college volunteered for Study 1. Five students (three females and two males, ages 21 to 32) met criteria for participation (i.e., emitted three consecutive incorrect responses when presented with an Italian word containing the target phonemes). All participants were enrolled in an undergraduate course in Italian language and culture that met once per week for 1 hour to prepare them for a cultural immersion experience. The focus of the instruction emphasized basic conversational fluency and grammatical structure of the language. Students were also given the instructions on how to decode Italian words (see Table 1).

Table 1. *Basic Italian pronunciations*

Italian	English	As in
A	Ah	Drama
E	Ay	Day
	Eh	Spaghetti
I	Eee	Deed
O	Oh	Go
	Aw	Awful
U	Oooh	Mood
Ci	Chee	Cheese
Ca	Ka	Kaleidoscope
Co	Co	Code
Cu	Coo	Cool
Chi	Key	Key
Che	Cay	Capable
Gi	Gee	Gee Whiz
Ge	Jay	Jade
Ga	Ga	Got
Go	Go	Go
Gu	Goo	Ghoul
Ghi	Ghee	McGee
Ghe	Gay	Game
Gli	“lyee”	the “li” in million
Gn	“nyuh”	the “ni” in “onion”

*Note.* All vowels are pronounced – none are silent. When consonants are doubled, the pronunciation is extended. R’s are rolled (slight for “r” and longer for “rr”)

*Setting and materials.* The first and last authors conducted all sessions at various locations at Lambert St. Louis, John F. Kennedy, and Hartsfield-Jackson Atlanta International airports. Materials included clipboards, timers, pencils, data sheets, and index cards with various letter combinations and Italian words printed on them.

*Experimental design.* A multiple baseline design (Baer, Wolf, & Risley, 1968) across phonemes with replications across participants was used to assess the effects of STS/VP on the accurate vocal production of Italian phonemes under textual control.

*Dependent variable.* Data were collected on the correct and incorrect production of target Italian phonemes when presented with a printed Italian word and were graphed as the percentage of trials in which participants emitted the correct sound(s).

*Italian sound inventory.* Participants were asked to read eight word lists (see Table 2). Each list focused on specific letter(s) that controlled a different sound in Italian than what the corresponding letters would control in English. If the participant made three consecutive errors they were asked to move to the next word list. The letter combinations selected for intervention are presented in Table 3.

Table 2. *Italian sound inventory word list*

Letter(s)	Words
ce	celebrare, celibe, cena, centesimo, cento, centrale, cercare, certamente, certo, cestino, cervello, cervo, concerto
ci	cielo*, cifra, cioccolatino, cipolla, circondare, circostanza, cittadino, coincidenza, cinque, ciglio, cintura
gi	giornalista, giorno, giovedì, gioventù, giardino, Gino, giornale, giustizia, giusto, giù
gu	guadagnare, guanti, guardare, guarire, guida, guidare, gusto, guancia, guada, guasta
sca	scambiare, scambio, scapolo, scarpa, scatola, scala, scarlatto, scaffale, scaldabagno, scarafaggio, scaldare
sci	scialle, scimmia, sciarpa, sciare, scienze, scienziato, Brescia, Masciarelli, fascia, sciocco, sciroppo, sciopero, fascisti
sc	scherzare, scolastico, scolpire, scontento, sconto, scommettere, scoprire, scusi, scaldare, scomodo
u	scusarsi, ubbidire, ubriaco, unico, l'unificazione, l'uomo*, l'uovo*, usare, usato, uscita

*Note.* <sup>a</sup>Do not follow general decoding rules.

Table 3. *Target phonemes for each participant*

Participant	Target phoneme
Michelangelo	ce, sci, ci
Pavarotti	ce, ci, sci
Puccini	ce, sci, gi, ci
Machiavelli	ci, ce, gi, sci
Verdi	ce, ci, sca, sci

*Experimental conditions.* The experimenters sat next to or across from participants (within 1 m) during baseline, STS/VP, and retention conditions.

*Baseline.* Participants were asked to read a set of words containing the target letter combination for each sound(s) selected for intervention. Participants were given five opportunities to respond to words selected at random from the words used in the Italian sound inventory. Baseline sessions were conducted until a stable baseline was demonstrated and/or an experimental effect was demonstrated for the sound taught using STS/VP instruction.

*STS/VP.* Experimenters indicated, using the STS/VP hand sign, the sound(s) that participants were producing (incorrect responding during baseline) and the sound(s) that the participants should be producing in the presence of the letter(s). For example, in the word “pesci”, (the target sound would have been evoked by “sc” followed by an “i”), learners often emitted /skee/ or /si/ rather than /shee/. Experimenters first indicated the target letter(s), vocally modeled the sound the participant was making (e.g., /skee/), and showed the corresponding STS/VP hand sign. Next, experimenters vocally modeled the correct sound (i.e., /shee/) and showed the learner the corresponding STS/VP hand sign. The participant then practiced vocalizing the target sound(s) and making the corresponding STS/VP hand sign in the presence of the letter(s) for three trials.

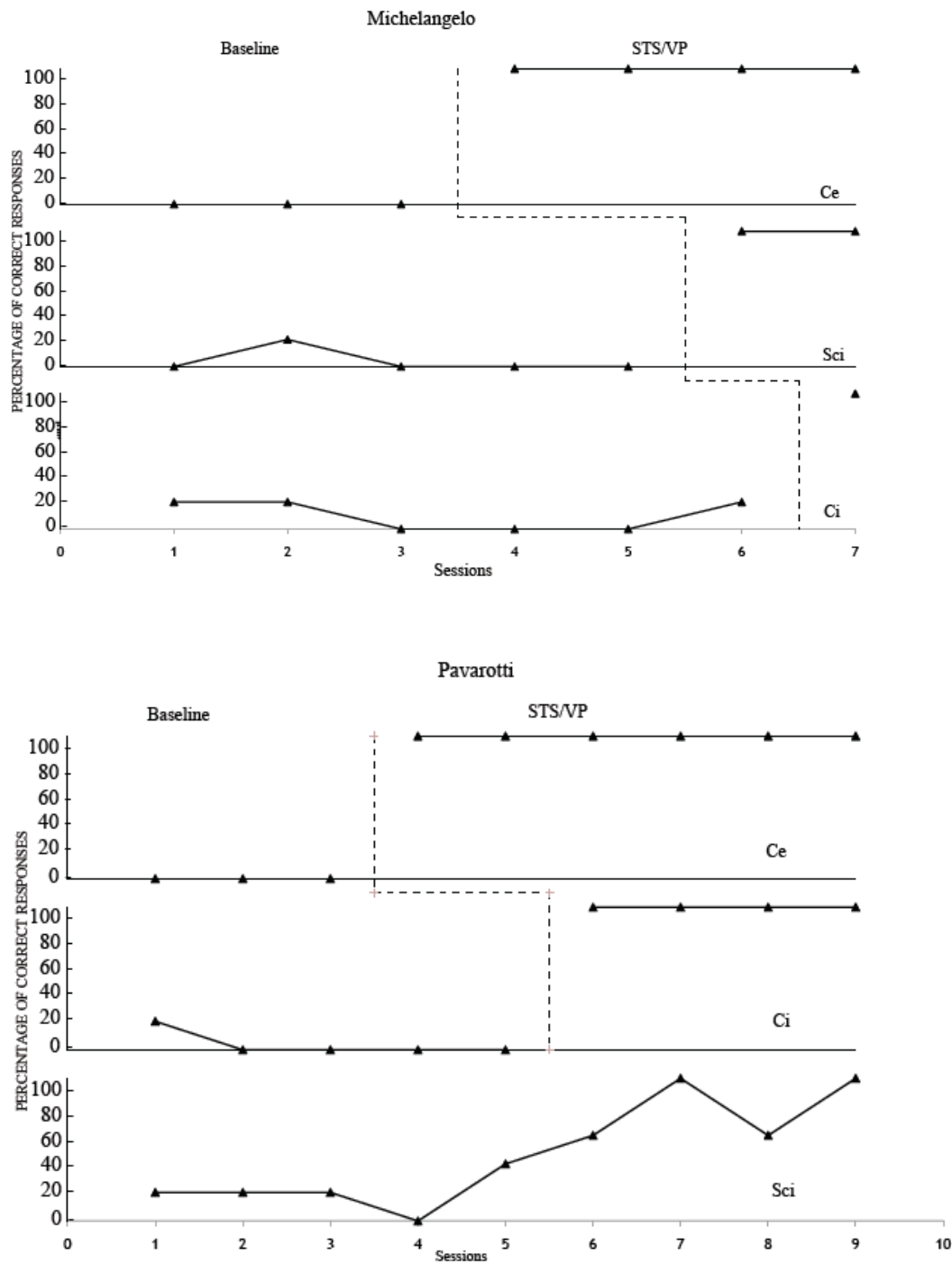
*Post STS/VP and retention.* Baseline conditions were repeated immediately following the STS/VP intervention and 9 days after the STS/VP instruction.

### *Results and Discussion*

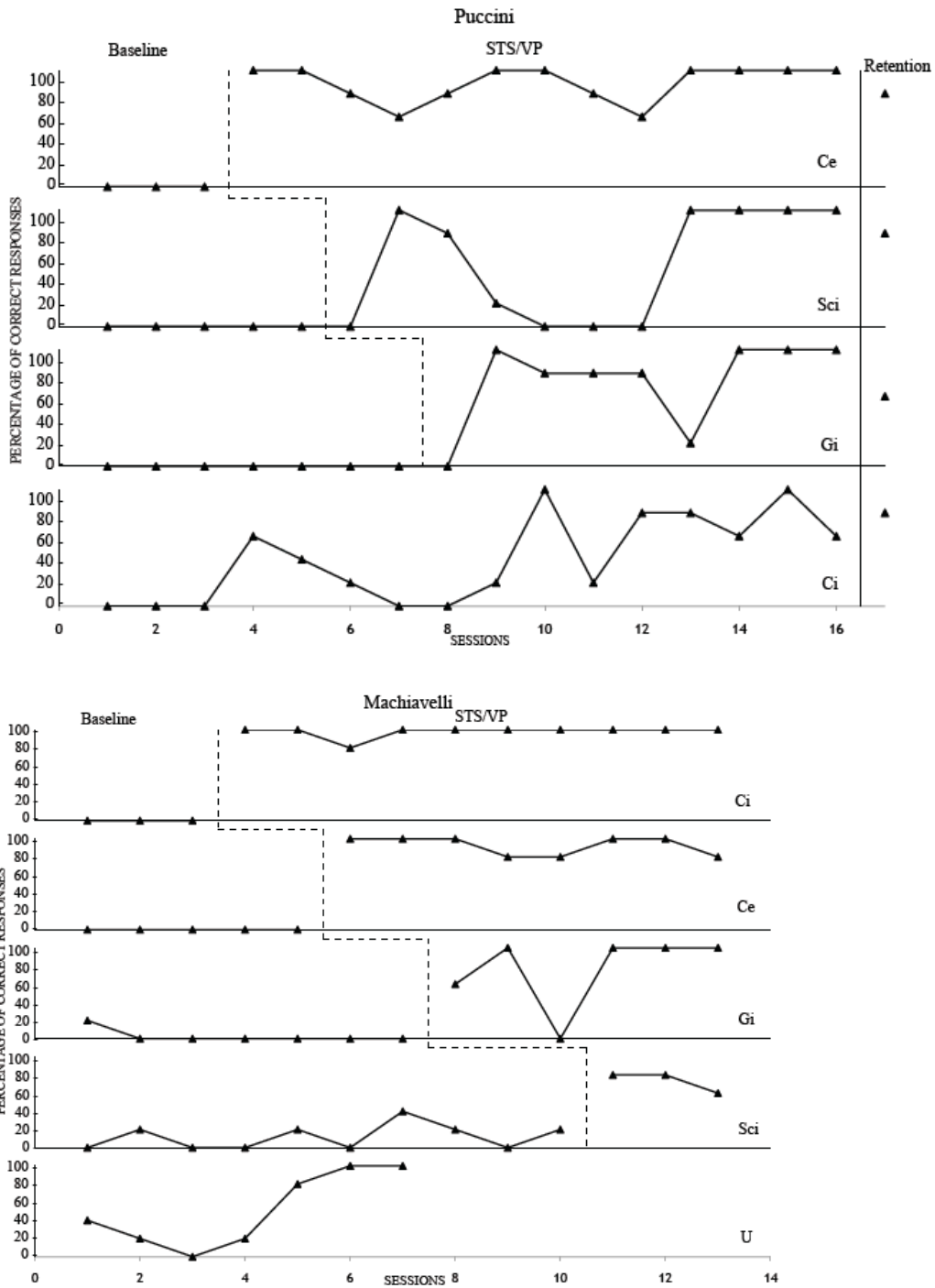
Despite classroom instruction, baseline data indicate that participants were unable to read several sounds embedded in Italian words. All participants acquired the target sounds following STS/VP instruction. In addition, participants emitted the target sounds correctly after a period of time without instruction at levels above baseline levels of performance (see Figures 1 to 3). These findings are consistent with the previous studies conducted with non-hearing impaired learners acquiring textual relations (Cihon *et al.*, 2008; Gardner *et al.*, 2013).

Each participant learned at least one sound without instruction. However, this study had several limitations. First, environmental conditions during experimental sessions were less than adequate given the distance between the experimenters (Texas) and the participants (Missouri) prior to the study. Sessions were conducted in airports on the experimenters' and participants' way to participate in a short-term study abroad trip to Italy. The experimenters were seated near the participants during experimental conditions, and it is likely that the participants were able to observe the data as they were collected and were therefore able to ascertain when they were emitting correct or incorrect responses. Second, given the number of opportunities to emit responses under baseline conditions for the final target phoneme, it is possible that participants were able to "guess" the target response and access reinforcement for doing so, even without "programmed" contingencies. Another possible explanation may be that as the participants moved through instruction for multiple sounds, responding may have come under the contextual control established in their prior instruction in the Italian language. This may have increased the probability that sounds represented in Italian were produced. In conjunction with the small number of target sounds, participants were likely, due to chance responding, to emit the correct response without STS/VP. Essentially, guessing may have been more skillful due to the participants' past history with Italian language instruction. Lastly, it is possible that STS/VP was not the variable responsible for the acquisition of the target phonemes. However, this explanation is unlikely given the number of phonemes acquired by each participant and the number of replications of the effects of STS/VP across participants.

Researchers designed a second study to address the limitations of Study 1. Namely, researchers assessed the implementation of the intervention by collecting treatment integrity data. In addition, the integrity of the dependent variable was assessed through the collection of inter-observer agreement data. To allow for a comparison of STS/VP over traditional modes of instruction, the second study was designed using an alternating treatments design.

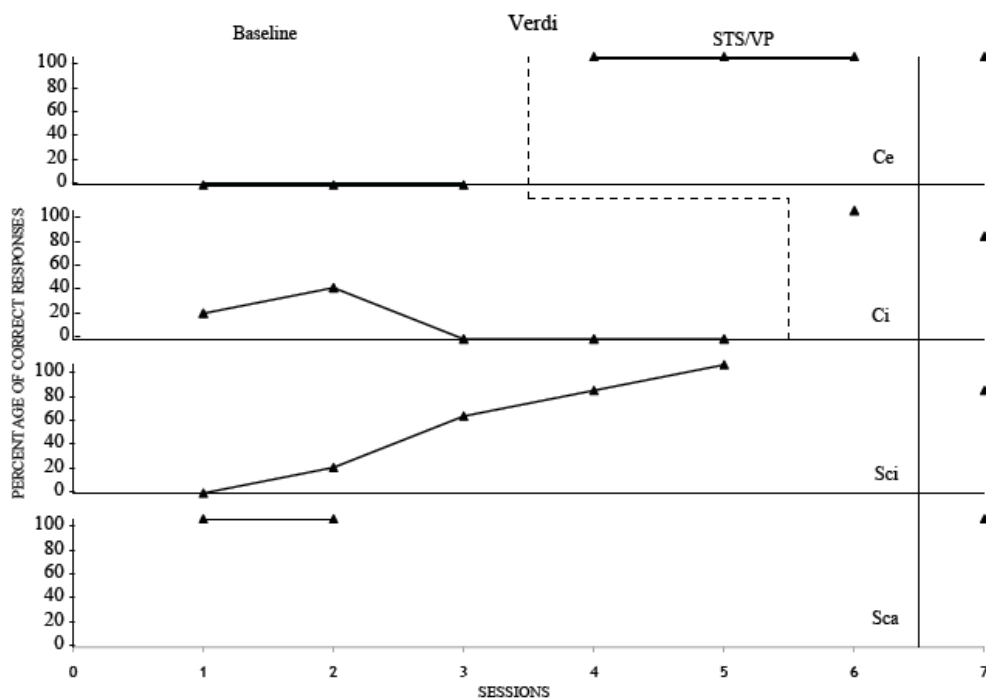


**Figure 1.** Participant data for target letter(s)-sound relations in baseline and following STS/VP instruction for Michelangelo (top panel) and Pavarotti (bottom panel).



**Figure 2.** Participant data for target letter(s)-sound relations in baseline and following STS/VP instruction for Puccini (top panel) and Machiavelli (bottom panel).





**Figure 3.** Participant data for target letter(s)-sound relations in baseline and following STS/VP instruction for Verdi.

Zaccagnini and Antia (1993) used an alternating treatments design with a preceding baseline to compare the effects of multisensory speech training or STS/VP on speech production for a nine-year-old female with a profound hearing impairment. Their results suggested that while the participant learned to produce all of the speech sounds in both experimental conditions, the non-STS/VP condition seemed to be slightly more efficient. The authors concluded that STS/VP was not an effective tool for speech production and was no more efficient than traditional teaching methods. It is possible that, if the current study were conducted in this manner, more clear conclusions regarding the role of STS/VP in comparison to traditional forms of instruction could be drawn. Finally, a more controlled experimental setting was arranged.

## Study 2

### *Method*

*Participants.* Ten individuals at the same Midwestern community college in Study 1 volunteered to participate in Study 2. Four participants were male, and six participants were female. The participants were between the ages of 21 and 34. One of the participants also participated in the first study. Participants in this study were enrolled in a theatre course with supplementary instruction in Italian. The goal of the course was to produce and perform a play in English and Italian in both Italy and the United States. The language instruction in the course focused on correctly delivering lines from the script in Italian and exchanging basic conversations that would support their interactions with native Italian speakers during rehearsals and cultural exchange experiences.

*Setting and Materials.* The first, second, third, and last authors conducted experimental sessions in two different classrooms at the community college. Materials included pencils, pens, data sheets, clipboards, and index cards with various written Italian words and phonemes.

*Baseline assessment.* Experimenters conducted a baseline assessment of each participant's accuracy of Italian decoding skills. Each participant was asked, individually, to read an Italian word containing one of the target sound(s) (see Table 3). Each sound was assessed independently. Participants were provided a total of five opportunities to emit each target sound in the presence of the representative letter(s) within a word. If a participant pronounced 60% or fewer of the sound(s) correctly, that individual met the criterion to participate in this study. All 10 volunteers qualified for participation.

*Experimental design.* We used an alternating treatments design across training groups (Barlow & Hayes, 1979). Sounds selected for instruction using STS/VP were counterbalanced across groups with those selected for instruction using modeling to analyze the effects of each instructional method on participants' production of Italian phonemes regardless of sound complexity. Instruction in each of the treatment conditions was delivered to a training group of four or five participants. Once instruction was delivered, each participant had an individual opportunity to respond. Training was conducted on eight Italian phonemes (see Table 4).

Table 4. *Target phonemes, the order of training, and the instruction used in each group*

Target Phoneme	Group 1 Instruction	Group 2 Instruction
Chi	STS/VP	Modeling
Gi	Modeling	STS/VP
Ci	STS/VP	Modeling
Ge	Modeling	STS/VP
O	Modeling	STS/VP
Sci	STS/VP	Modeling
Gn	Modeling	STS/VP
A	STS/VP	Modeling

*Experimental conditions.* The effects of two instructional strategies were assessed in this study. The first condition utilized a combination of STS/VP and modeling, and the second condition used modeling alone. In each training group, four sounds were taught using STS/VP and modeling, and four sounds were taught using only modeling.

*General procedure.* In each condition, sessions began with the participants sitting around a table facing the experimenter. Participants received individual opportunities to respond even though instruction was delivered to all participants in the training group. No feedback was provided regarding correct or incorrect pronunciation in either condition. Each experimental session contained a training and testing phase. In the training phase, participants were taught how to pronounce the target Italian sound in the presence of the corresponding letter(s), and in the STS/VP condition, they were also taught how to produce the STS/VP hand sign.

*STS/VP and modeling.* The experimenter presented the target letter(s) written on a 3"x5"

index card to the students and modeled the target sound(s). The index card with the written letter(s) remained visible to the participants for the next five steps. The experimenter then modeled the sound once more in an exaggerated fashion. Next, the experimenter demonstrated the STS/VP hand sign that corresponded to the target sound(s) and showed to the participants the corresponding STS/VP written code. The student then made the hand sign and said the sound once with the experimenter. The student was then required to produce the hand sign while saying the sound four times on his/her own.

Finally, the experimenter presented a field of three index cards in front of each participant in turn; each index card had one of the eight target letter(s) written on it. One of the index cards showed the sound(s) that had just been trained and each participant was asked to select that sound. If a participant selected the correct letter(s), the index cards were shuffled, and three new cards were placed in front of the next participant. If a participant selected the incorrect letter(s), the participant was corrected and shown the correct choice. The experimenter would continue to the next participant then come back to the participant that answered correctly at the end of the training phase.

*Echoic (Modeling).* This procedure was similar to the procedure detailed above, except that the STS/VP hand sign and written codes were omitted from the instruction. An equal number of opportunities to respond were presented in both training conditions.

*Testing phase.* Each participant was presented with an index card with an Italian word containing the target letter(s). The participant was asked to read the word. The card was then placed at the back of the deck, and the next participant was asked to read the next word. This continued until each participant had five opportunities to read a word with each target sound(s). Participants that correctly produced 80% (4/5) of the sounds within the words moved onto training for the next sound in the training sequence. Those participants that failed to score 80% or higher in the testing phase received additional training sessions for that target sound.

*Additional training.* After the session in which a participant failed to achieve the session criterion, the next sound in the training sequence was trained for all participants. Then, participants who did not reach mastery on the previous sound would stay in the classroom, and the other participants would leave. An additional training session was held. This pattern continued until a participant required three training sessions for a particular sound. If a participant required a fourth instructional session to reach mastery, sessions would continue for that sound until mastery was reached.

*Dependent variables.* The primary dependent variable was the number of sessions participants took to reach the 80% mastery criterion. The second measure was the percent accuracy within each session.

### *Treatment Integrity*

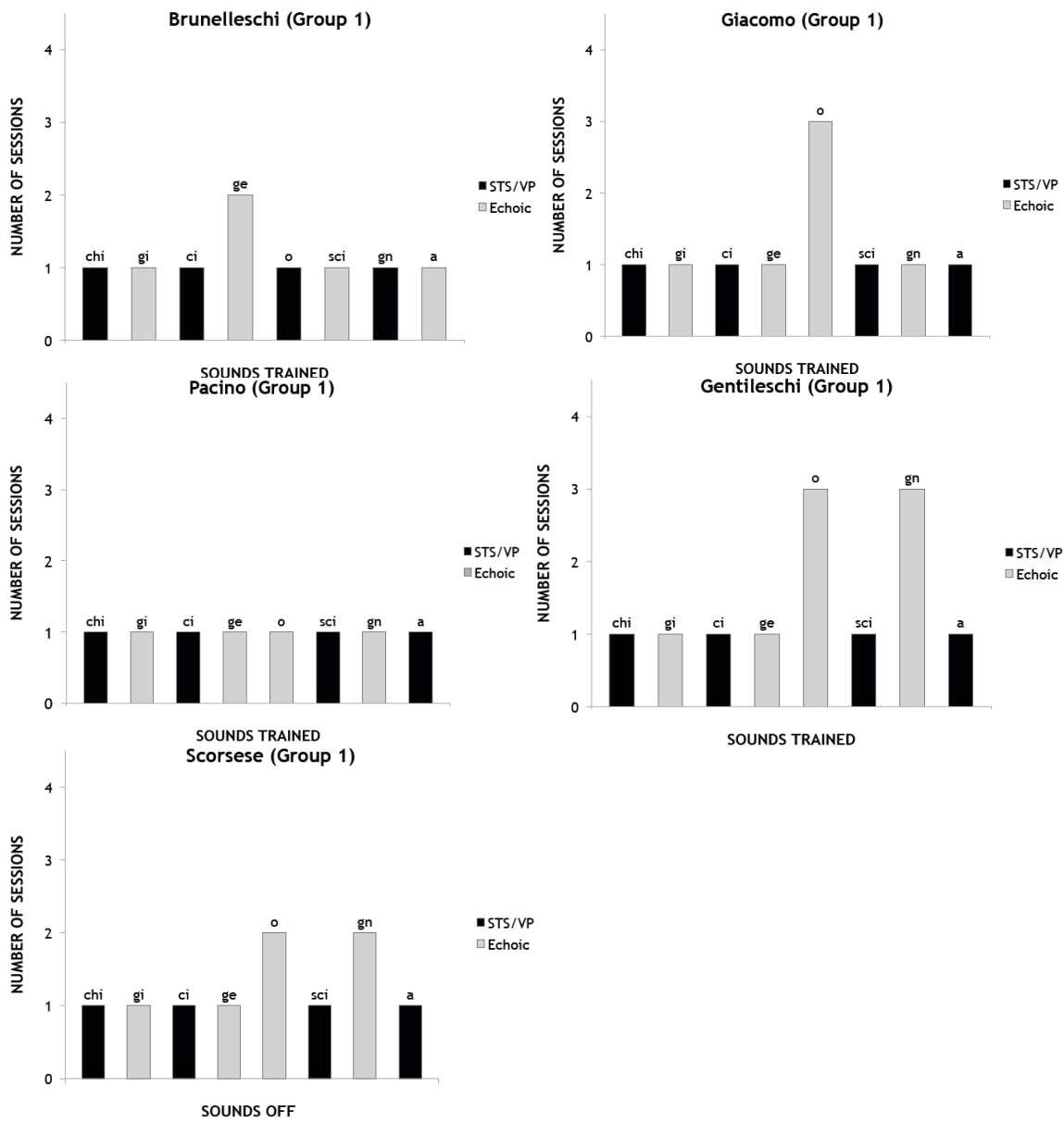
Treatment integrity (TI) data were collected for 32% of sessions in the STS/VP training condition, and 54% of sessions in the modeling condition. The mean TI in the STS/VP and modeling condition was 100%. The mean TI in the modeling condition was 98.1% (range, 87.5%

to 100%).

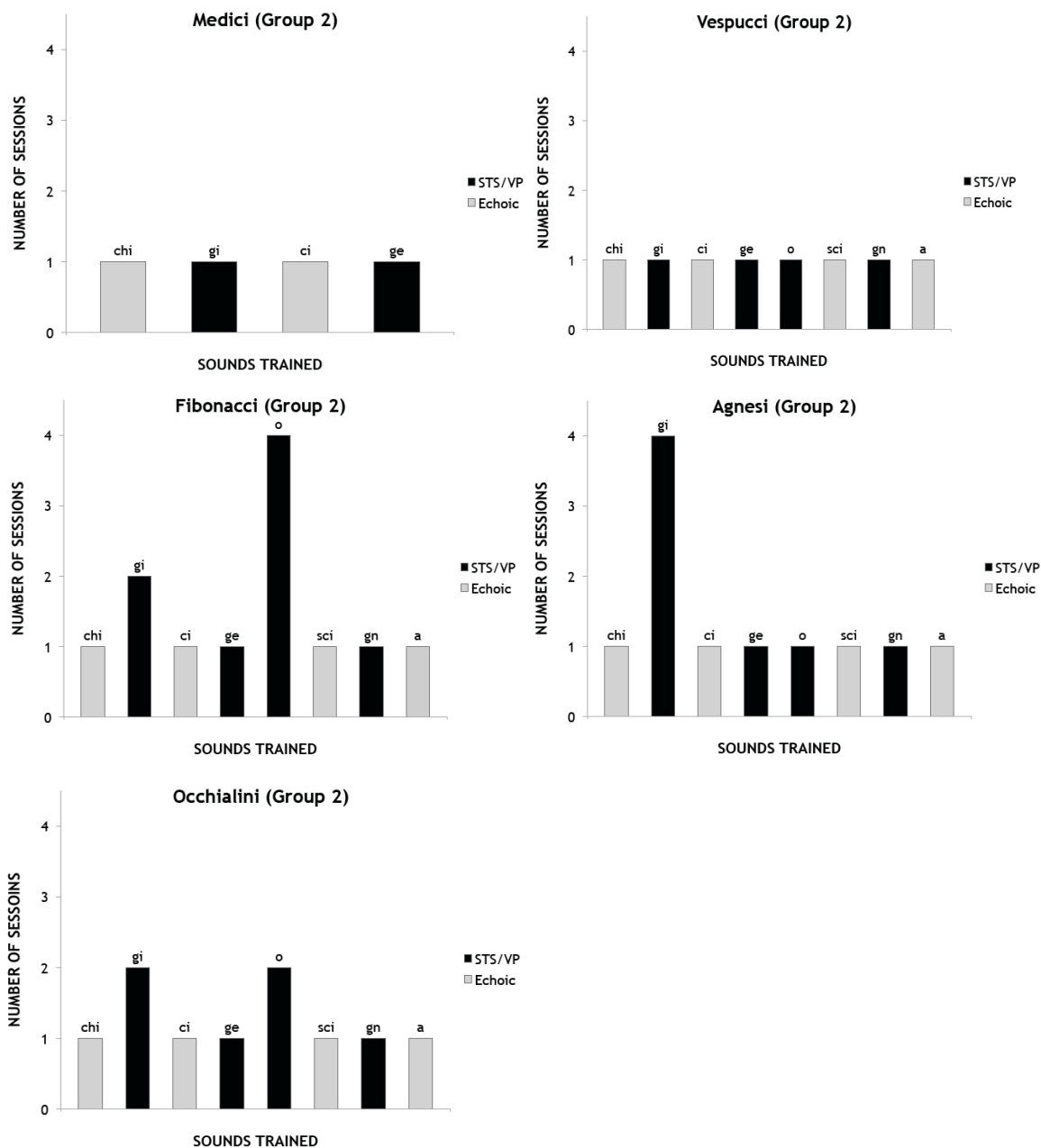
*Inter-observer Agreement*

Inter-observer agreement (IOA) data were collected for 42% of sessions in the STS/VP and modeling condition and 38% of modeling only sessions. The mean IOA in the STS/VP and modeling condition was 89% (range, 60% to 100%), and the mean IOA in the modeling only condition was 95.4% (range, 88.0% to 96.0%).

*Results and Discussion*



**Figure 4.** Group 1 participant data for target letter(s)-sound relations taught using STS/VP or Modeling (Echoic).



**Figure 5.** Group 2 participant data for target letter(s)-sound relations taught using STS/VP or Modeling (Echoic).

Figures 4 and 5 depict the number of sessions that each participant took to reach the mastery criterion (4/5 trials correct in a session) for each letter(s)-sound relation. Results for participants in Group 1 (Figure 4) show that none of the participants required more than one session to reach mastery for any of the sounds trained using STS/VP instruction (chi, ci, o, and gn). Four participants required more than one session to reach mastery for sounds trained via modeling. Brunelleschi (top left panel) required two sessions to reach mastery for “ge” Giacomo (top right

panel) required three sessions to reach mastery for “o” Gentileschi (middle right panel) required three sessions to reach mastery for both “o” and “gn” and Scorsese (bottom left panel) required two sessions to reach mastery for both “o” and “gn.”

Figure 5 depicts the same data for participants in Group 2. Medici (top left panel) was unable to complete the entire experiment and received training on only the first four sounds. Two participants, Medici (top left panel) and Vespucci (top right panel) reached the mastery criterion for all sounds for which they received instruction. None of the participants required more than one session to reach mastery for sounds taught via modeling. Fibonacci (middle left panel) required two sessions to reach mastery for “gi” and four sessions to reach mastery for “o” Agnesi (middle right panel) required four sessions to reach mastery for “gi” and Occhialini (bottom left panel) required two sessions to reach mastery for both “gi” and “o.”

Table 5 shows the number of additional instructional sessions that were required to reach mastery, beyond the minimum possible, summed across participants. If all four or five participants reached the mastery criterion on the first session for that sound, then a zero is depicted in the corresponding location. None of the participants required more than one session to reach mastery for “chi,” “ci,” “sci,” or “a.” The sound “gi” was difficult for participants in Group 2, but not for participants in Group 1; “ge” produced difficulty for only one participant in Group 1; “o” produced difficulty for multiple participants in both Groups; and “gn” only produced difficulty for participants in Group 1.

Table 5. *Additional instructional sessions required to reach mastery across participants*

Target sound	Group 1 <sup>2</sup>	Group 2 <sup>1</sup>
Chi	0	0
Ci	0	0
Sci	0	0*
A	0	0*
Gi	0	5
Ge	1	0
O	5	4*
Ga	3	0*

Note. <sup>1</sup> The first four values in group 1 column and the last four values in the group 2 column are results for the corresponding sounds taught using STS/VP training

<sup>2</sup>Number of additional training sessions beyond the minimum across participants

\*Data for one participant are not available; participant left experiment early

While the second study allowed researchers to assess the relative effectiveness of STS/VP over modeling, the results were still idiosyncratic showing minimal differences across participants with very few teaching sessions required to acquire the target letter(s)-sound relations. The data depicted in Table 5 appear to be the most consistent; however, these data suggest that some variable related to the letter(s)-sound relation (“o” producing the eastern /aw/) or to the teaching strategy produced the varied results. In addition, it seemed that some participants relied on the STS/VP hand sign (it was observed that participants would make the hand sign and then emit the corresponding sound) while others did not. In an effort to gain additional information regarding these new questions, experimenters designed another study. Study 3 focused on only two letter-

sound relations in order to minimize the complexities associated with various letter(s)-sound relations. A least to most intensive sequence of instruction was implemented in order to determine what individual participant variables may lead to the necessity of STS/VP rather than other, more traditional interventions.

### Study 3

#### *Method*

*Participants.* Six undergraduate students at the same Midwestern community college participated in Study 3. All participants were enrolled in an undergraduate course in Italian language and culture (GLE 101) that met once per week for 1 hour to prepare them for a cultural immersion experience.

*Setting and materials.* Materials included clipboards, timers, pencils, index cards, data sheets, and an initial script based on thematic units derived from the course textbook, *Ciao!* (Riga & Dal Martello, 2006). Sessions were conducted during initial GLE 101 class sessions. Generalization and maintenance data were collected 1 to 3 weeks following acquisition of the sound(s).

*Experimental design.* A nonconcurrent multiple baseline design (Carr, 2005) across participants with an embedded BA, BACA, BACADA, or BACADAEA design, replicated across vowel sounds was used to assess the effects of large-group, rule-based instruction; modeling; or STS/VP hand sign plus modeling; or STS/VP hand sign and code plus modeling on the accurate vocal production of Italian vowel sounds embedded in Italian words.

*Dependent variable.* Data were collected on the frequency of correct and incorrect vocal productions of target Italian vowel sounds.

*Independent variables.* A treatment package consisting of group-instruction, modeling, and STS/VP was used to teach target Italian vowel sounds. Participants were first introduced, via instructor-provided rules, to the speech sounds governed by each letter combination in the Italian language. One-on-one modeling that consisted of a hear/say instruction in the presence of the target letter followed large group instruction for participants who were still emitting errors in the testing phase (A). Participants were asked to repeat modeled vowel sounds in the presence of the target letter. STS/VP hand sign training augmented modeling when it was not effective in producing the target decoding repertoires. Finally, for participants who were still unable to decode the target letters, STS/VP written code training was conducted.

#### *Assessment of English Reading Repertoires*

All participants were native English speakers who could decode English words fluently. English decoding fluency was assessed by having each participant read a short passage (in English) to an experimenter prior to the first assessment of Italian decoding repertoires.

*Group instruction.* Participants were given Italian pronunciation rules in a large group,

classroom-setting format. The course instructor provided participants with a handout that indicated the basic sounds that should be produced given specific letter(s) (see Table 1). In addition, the course instructor modeled each Italian phoneme both in isolation and within a word.

*Assessment of Italian textual repertoires.* Participants were asked to read a script (see Figure 6) in Italian containing words with the vowels “i” (says “ee”) and “u” (says “oo”). Participants were given at least three opportunities to respond to each of the letters, respectively. Assessment data were collected until a steady baseline was achieved (three consecutive data points demonstrating no upward or downward trend) or an experimental effect (performing at criterion of 4 out of 5 responses correct) was demonstrated for each vowel. Participants who emitted five errors or demonstrated a steady baseline (those not showing an experimental effect) moved to the modeling condition.

### Unit 1 Script

You are lost and trying to find your way back to a museum to take a tour. You find the tourist information office. Ask the staff in the office for information on how to return to the museum and information on a tour.

**You.** Scusi, sono un(a) turista. Dov'è il museo?

**Staff.** Il museo? A quel semaforo, vicino l'autobus, giri a destra,

poi avanti diritto. Non può sbagliare.

**You.** Un autobus? Ripeta, per favore.

**Staff.** A quel semaforo, giri a destra, poi avanti diritto. Capisce?

**You.** Sì, capisco. Grazie. C'è un tour turistico, per favore?

**Staff.** Sì, c'è uno turistico. Ecco le informazioni.

**You.** Grazie, arrivederci!

**Figure 6.** Sample script used to assess Italian reading repertoires.



*Modeling.* The experimenter showed the participant the word missed in the script and modeled the mispronounced sound (e.g., showing the letter “i,” while explaining “you said “i” as in ice). The experimenter then modeled the correct pronunciation of the sound in isolation and once again within a word (e.g., “when you see “i” you should be saying “ee” as in “me”). The participant was asked to practice the sound in isolation. If correctly pronounced, the participant was then asked to continue to read the next three words in the script containing the target vowel.

*Assessment of Italian textual repertoires II.* Participants were then asked to continue to read the Italian script containing words with the vowels “i” and “u”. Decision-making criterion mirrored that of the previous assessment of Italian textual repertoires. However, now, if participants emitted up to three errors or demonstrated a stable trend (those not showing an experimental effect), or made more errors than correct emissions of the sound, they were moved to STS/VP hand sign training.

*STS/VP hand sign training.* Experimenters indicated the vowel that participants were producing (incorrect responding during assessment(s)) and the phoneme that the participants should have been producing in the presence of the letter/word using the STS/VP hand sign. Experimenters first indicated the target letter, verbally produced the sound the participant was making (the error), and showed the corresponding hand sign. Next, experimenters produced the correct sound and showed the learner the corresponding hand sign. The participant then practiced making the target vowel sound and corresponding hand sign in the presence of the target letter. If correctly pronounced the participant was asked to pronounce the vowel for the last three words from the script that contained the target vowel.

*Assessment of Italian textual repertoires III.* Participants were asked to continue to read the Italian script containing words with the vowels “i” and “u”. Decision-making criterion mirrored that of the previous assessment of Italian textual repertoires. However, now, if participants emitted up to three errors or demonstrated a stable trend (those not showing an experimental effect), or made more errors than correct emissions of the sound, they were moved to STS/VP code training.

*STS/VP code training.* Experimenters told the participant that if they had trouble remembering the hand sign and the sound that a letter made, we could show them a written code that could help them remember what sound to make when reading in Italian. The experimenter drew the target written code under three letters for the target sound. Then, the experimenter showed the participant how the code looked like the STS/VP hand sign and how it could be used to remember the sound of the letter. The participant then practiced making the target vowel sound and corresponding hand sign in the presence of the target letter and written code. If correctly pronounced, the participant was asked to pronounce the vowel for the last three words from the script that contained the target vowel.

*Assessment of Italian textual repertoires IV.* Participants were asked to continue to read the Italian script containing words with the vowels “i” and “u”. Participants were given at least five opportunities to make the sound for each target vowel.

### *Interobserver Agreement*

All experimenters were trained on the procedures for each condition, especially modeling and STS/VP. Experimenters were given datasheets that included the scripts, and they followed these scripts as the participants read in real time. IOA was collected for at least 30% of all experimental sessions. IOA was calculated by taking the total number of agreements and dividing this number by the total number of agreements plus disagreements and multiplying by 100%. The mean IOA was 97% (range, 94% to 100%) across all experimental conditions.

### *Treatment Integrity*

Experimenters were given procedural checklists on each condition to review. Experimenters scored the frequency of correct or incorrect implementation of the procedural tasks in real time for each condition. Treatment integrity was collected for at least 30% of all experimental conditions and was calculated by dividing the total number of steps completed correctly by the total number of steps and multiplying the quotient by 100. Treatment integrity was 100% for Assessment of English and Italian Reading Repertoires, 100% for modeling and STS/VP code conditions, and 89% (range, 79% to 100%) for STS/VP hand sign conditions.

### *Results and Discussion*

Individual participant results are depicted in Figures 7 and 8. Each participant acquired the target letter-sound relations. Francesca, Fabiola, Valentina and Luisa (Figure 7) acquired both letter-sound relations following group instruction. Fabiola (top right panel), Valentina (bottom left panel), and Luisa (bottom right panel) maintained the target letter-sound relations during retention checks. Francesca (top left panel) was unable to participate in retention checks due to poor class attendance. Massimo (Figure 8, top panel) acquired one letter-sound relation (“i”) following modeling, but required modeling and the STS/VP hand sign to acquire the other letter sound relation (“u”). Both letter-sound relations maintained during retention checks. Filomena (Figure 8, bottom panel) acquired one letter sound relation (“u”) following group instruction, but required modeling, STS/VP hand sign, and STS/VP written code to acquire the second letter-sound relation (“i”). The letter-sound relation for “u” maintained during retention checks; however, no retention checks were obtained for “i” due to the length of time necessary for Filomena to acquire this letter-sound relation.

In general, four participants acquired both letter-sound relations with only group instruction. Results maintained for three of these participants. For two other participants, one acquired one letter-sound relation following group instruction, and one acquired one letter sound following modeling. Both required additional instruction to acquire the second letter-sound relation. For one of these participants, modeling plus STS/VP hand sign was sufficient; the other participant required modeling, STS/VP hand sign, and STS/VP written code in order to learn the target letter-sound relation. Of the participants who required additional instruction (beyond that of group instruction), each required additional teaching with different letter-sound relations.

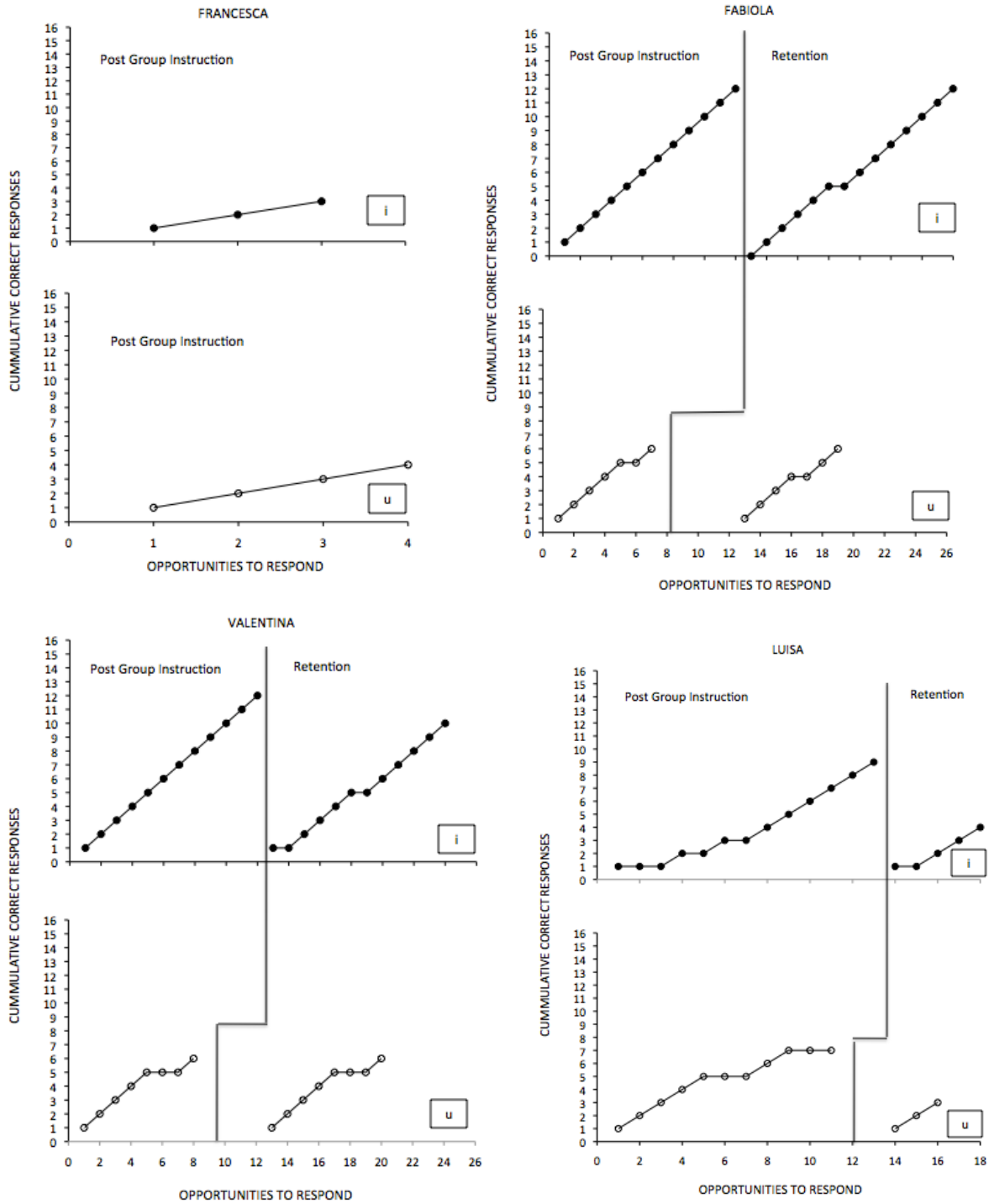
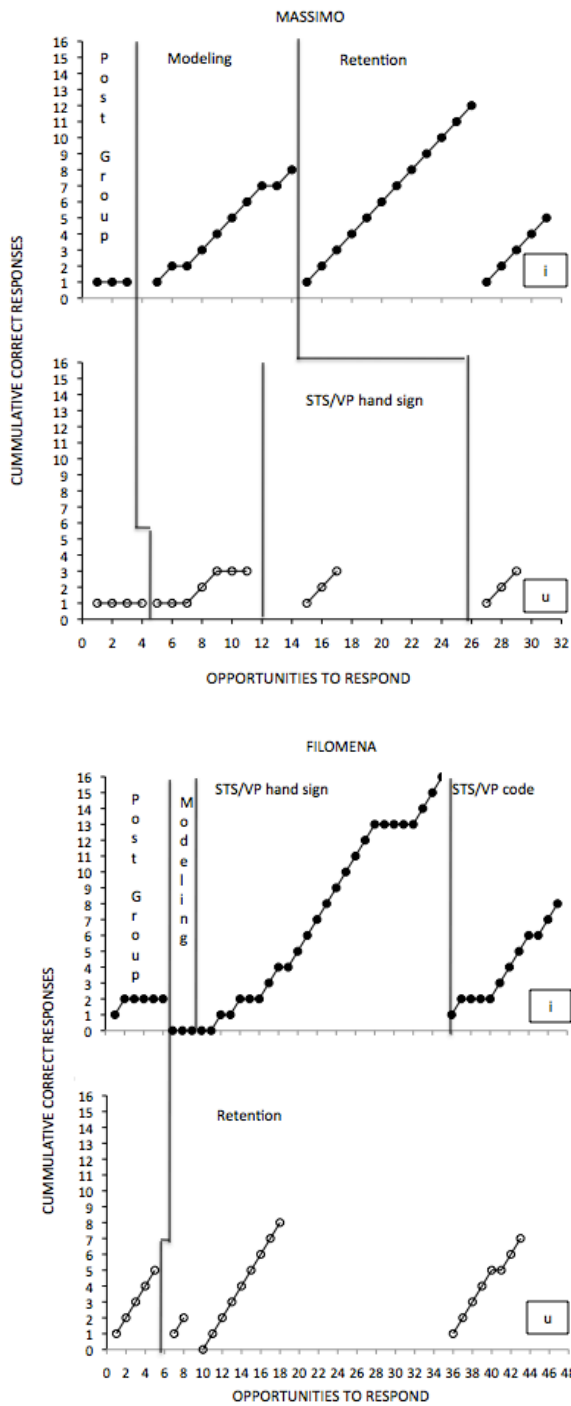


Figure 7. Participant data for target letter-sound relations taught via large group instruction.



**Figure 8.** Participant data for target letter-sound relations taught via large group instruction, modeling, STS/VP hand sign (top panel) and STS/VP code (bottom panel).

*General Discussion*

The cumulative results suggest that while individual learner’s responsiveness to intervention

strategies were varied, all participants acquired the target letter(s)-sound relations in each experiment. Moreover, all participants responded favorably to at least one of the intervention strategies and the results maintained during retention checks. These data suggest that, if willing, L2 learners who acquire an effective decoding repertoire through rule-based instruction, modeling, STS/VP hand sign and/or STS/VP written code can utilize this repertoire for future vocabulary development (e.g., self-instruction, grammar translational method).

We employed the use of single-subject research design to assess our empirical questions. Single-subject research design differs from between-group research design in that in single-subject research, each participant serves as his/her own control (Hersen & Barlow, 1976). In this experimental arrangement, each participant experiences each independent variable and its effectiveness on the dependent variable is compared against his/her performance on the dependent variable prior to or following the onset of the intervention. Single-subject research design holds several advantages from a teaching perspective, as it is quite similar to the process employed by instructors to evaluate individual student performance. For example, instructors expect that students' grades will change as a function of the instructor's teaching. Changes to one's teaching ought to functionally correspond to changes in students' performance (see Cihon & Stephens, 2011 for further discussion of the relation between teaching and single-subject design). The use of single-subject design allowed experimenters to determine that some L2 students in the current experiments required more intensive intervention and how each were individually impacted by the forms of instruction employed. Specifically, for those learners requiring more intensive instruction STS/VP was an effective tool. These findings provide L2 instructors with a range of options to facilitate the acquisition of L2 decoding repertoires that require minimal effort to implement and a relatively short duration of instruction (even STS/VP instructional sessions lasted no longer than 10 minutes in duration for each target letter(s)-sound relation).

Single-subject research design is often critiqued with respect to its external validity. Across the three experiments, a total of 26 individuals participated (10, 10, and 6, respectively). From a between-groups research perspective, this sample size would likely yield limited information (e.g., comparing the performance of two groups of 13 learners across differing conditions would have limited power). With the baseline logic employed in single-subject design (i.e., each participant serves as his/her own control), conclusions regarding the functional relation between the independent and dependent variables can be made in the current experiments. Yet the generality of the findings may still be restricted to learners with particular histories as related to accessing print in either the L1 or the L2.

Experimenters specifically sought to determine the role of STS/VP in the acquisition of decoding repertoires for Italian L2 learners, limitations to the experimental designs and letter(s)-sound relations targeted for instruction in the first two experiments preclude strong conclusions regarding STS/VP effectiveness. The third study was designed with the consideration that while STS/VP may be an effective instructional tool (see Study 1), it might not be a necessary instructional tool for all L2 learners (see Study 2 & 3). Not surprisingly, then, the results of the third experiment suggested that only two of the six participants who needed a more intrusive intervention to acquire the target letter-sound relations needed STS/VP. There are several possible explanations for this finding. First, the possibility exists that each learner had a different

proficiency level with respect to phonological knowledge of his/her L1. While researchers attempted to control for this possibility in the third experiment, the English decoding repertoire assessment was quite rudimentary, and it is possible that a more rigorous assessment (i.e., Ganske, 2000) might provide information regarding specific features of the L1 that might have interfered with acquisition of the decoding repertoire in the L2. Second, we targeted only two target letter-sound relations in the third experiment. It is possible that as more target letter-sound relations are taught simultaneously, more learners may require more intensive interventions to effectively decode in Italian. Finally, Italian is a transparent language (some even say the most transparent), meaning that each letter produces a sound and very few letters or letter-combinations produce different sounds (e.g., with a few exceptions, the “i” says /ee/). Therefore, it is possible that learning to read in a less transparent language (e.g., English or French) may also produce different results.

Nonetheless, specific features of the L2 of interest may also impact the research in this area. Even in a transparent language, L2 instructors may struggle with issues pertaining to regional pronunciations and/or dialects. Some letter combinations may produce different sounds in different regions; a detailed analysis of such is beyond of the scope of this paper (see Repetti, 2000 for a detailed discussion of the dialects of Italy). In addition, some letter combinations may follow a general rule such as those we used with respect to the letters “i” and “u” (when you see “i” say /ee/ and when you see “u” say /oooh/). However, in certain words, these letter sounds blend with other features of the language and to follow these rules would result in a pronunciation error. In the first study, *cielo*, *l’uovo*, and *l’uomo* illustrate this dilemma. The sound commonly associated with the letter “i” is minimized in the pronunciation of *cielo*. Also, the sound produced when the “u” is followed by an “o”, as in *l’uovo* and *l’uomo*, is altered to a semi-consonantic sound (i.e., [w]). L2 researchers and instructors alike are in a constant struggle to decide when to teach general rules with respect to reading and when to introduce L2 students to the exceptions to the rules. Perhaps this struggle does not differ so tremendously from those attempting to teach native English speakers to develop decoding strategies in their L1. Initial instruction often focuses on that of the general rule that each letter makes one sound and only later are variations and exceptions introduced such as in variant spellings that evoke particular vowel sounds (see Ganske, 2000). Given the limited experience with the Italian language of the participants in these studies and the limited time with which we had to produce learning, experimenters opted to teach the general rules associated with Italian letter(s)-sound relations.

As previously mentioned, teaching reading to L2 learners can be a daunting, or at least complicated, task. Our findings have implications for those developing instructional strategies for L2 students learning to decode print. L2 instructors often meet with a group of learners with unique histories related to how they access text. Some L2 students may be skilled decoders in their L1 while others may rely heavily on context or sight-based reading strategies. In order to meet the needs of the majority of the students, the L2 instructor seeks the instructional strategy that will produce the best results with the greatest number of students in the least amount of time. The GLE 101 instructor (third author) was a key member of the experimental team. He served as the primary instructor in the second experiment and was instrumental in the delivery of the large-group instruction in the third experiment. The results of the second and third experiments suggest that most participants learned specific letter-sound relations in the L2 through large-group, rule-based instruction or modeling – both strategies successfully implemented by the GLE 101

instructor. Most learners acquired the target letter(s)-sound relations through the least restrictive interventions (group instruction or modeling). However, as particularly evident in the results of the third study, some participants required more intensive instruction.

The research described here suggests additional studies that may inform the effectiveness of interventions designed for L2 instruction. For example, questions remain as to which learners struggle with the acquisition of L2 decoding repertoires. Research can be designed to assess L1 phonological knowledge and assess interventions that focus first on developing the fluency in the L1 before proceeding with instruction in L2. In addition, a similar series of studies addressing the role of the explored interventions on less transparent L2s could provide information to those developing instruction for that group of L2 learners. Moreover, researchers might investigate the long-term retention rates (3 months, 6 months, 1 year) of decoding repertoires taught with the various strategies utilized here. Finally, additional research regarding the role of and the necessity of L2 decoding repertoires in L2 acquisition would be useful to inform our ability to select between the various strategies available for supporting L2 learners.

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